VOLUME 39
NUMBER 10

OCTOBER, 1952

plating

POSTMASTER: IF UNDELIVERABLE RETURN TO
5800 N. MARVINE ST., PHILADELPHIA 41, PA.
RETURN POSTAGE GUARANTEED

**PHILADELPHIA—HOST CITY
1953 A.E.S. CONVENTION**

See Contents Page 1117

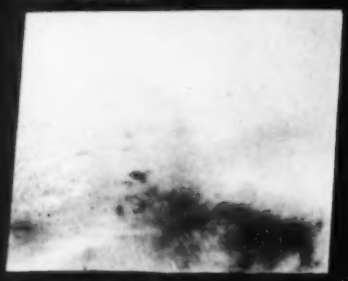
A Revolutionary Development in Electrocleaning

CLEPO 120 CLEANER

FOR REVERSE CLEANING OF BRASS

ORDINARY BRASS CLEANER — Direct Electroclean — Shows drying stains which occur during transfer from cleaner.

ORDINARY BRASS CLEANER — 30 Sec. Reverse Electroclean — Shows burning and dezincification.



ORDINARY BRASS CLEANER — 2 min. Reverse Electroclean — Shows burning, loss of luster and dezincification.

CLEPO 120 CLEANER — Both Direct and 2 min. Reverse Electroclean. Brilliant color and mirror-like reflection.

Rapid Cleaning Action
No Tarnish on either Reverse or Direct current
No Staining during transfer to Rinse
Can be used for Brass, Copper, Steel-Die Castings
Low in Cost – High in Results.

Contact your Clepo Service man for a Demonstration in your plant.

FREDERICK **GUMM** Chemical Company Inc.

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ENTHONE ENAMEL STRIPPERS

Custom Made

to fill your particular needs . . .

If you have trouble finding the right stripper to remove the coating on your work, Enthone will be glad to select the right one from the many they make or will formulate a new one that will meet your requirements.

All you have to do is fill out a questionnaire which will be sent you on request, send this to us with typical samples of your work. Enthone Research Chemists will make the necessary tests and tell you how your problems can be solved. There is no charge for this service.

Enthone Research Chemists have developed over a score of strippers for organic finishes and are constantly seeking better methods.

Write for Enthone check list on over sixty products and processes for better electroplating and metal finishing.

METAL FINISHING PROCESSES

ENTHONE
INCORPORATED
442 ELM STREET
NEW HAVEN, CONNECTICUT

ELECTROPLATING CHEMICALS

Mechanized handling in the different sequences is the basis of profitable production plating. In the MEAKER designs of automatic plating machines this handling is flexible so that adjustments and modifications are easily made to meet practically every plating requirement. Too, the simple rugged construction insures uninterrupted schedules and minimum maintenance costs.

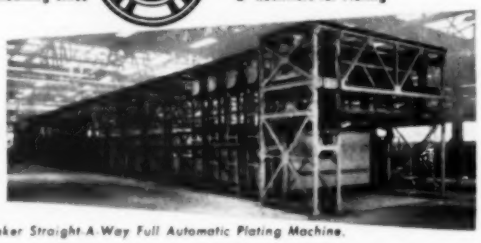
Get full particulars to meet your plating requirements from The Meaker Company, 1639 South 55th Avenue, Chicago 50, Illinois.

MEAKER

- Full Automatic and Semi-Automatic Electroplating Equipment
- Strip Steel Plating Equipment
- Wire Galvanizing Equipment
- Strip Steel Electrocleaning Lines
- Pickling Machines
- Processing Conveyors
- Motor Generators for Plating
- Rectifiers for Plating

MEAKER PRODUCTS

PLATING EQUIPMENT FOR OVER 50 YEARS



A Meaker Straight-A-Way Full Automatic Plating Machine.

1082 FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A 1202.

In This Issue

Increasing Copper Content in White Brass and Copper Cyanide Solutions by Electrolytic Regeneration by Walter R. Binai is a description of a new method for introducing copper or other metals into plating solutions by means of an electrolytic regeneration cell which uses diaphragms of deresinized cypress. These cells have proven themselves very successful in heavy deposition of silver in air craft applications and are in use in a number of fully automatic plating operations.

Your Dentist's a Plater, Too by Dr. Walter J. Krumbeck is a paper with considerable human interest about the use of plating techniques in the dental profession. It has a small amount of technical information in its description of electroformed tooth restorations that is of general interest to the average plater.

Copper Striking on Zinc Base Die-Castings by Irvin K. Hauseman is a type of paper that has been high on the list of those requested by many of our readers. It is written by a practical man and cites the miscellaneous problems that are met in the operation of a job shop. Of special interest in the paper is the section that outlines the unorthodox cycle finally worked out to overcome the problem of "casting patterns" in die-cast plating.

Philadelphia, Host City, A.E.S. Convention, 1953. The informative story of the "City of Brotherly Love" and the site of the 1953 Convention. In it are briefly told the cultural and technical advantages that will benefit those who attend the sessions. It also constitutes a preview of the 1953 "Philadelphia Story" which will be fully told in succeeding issues of this publication.

Disposal of Plating Room Wastes. IV. Batch Volatilization of Hydrogen Cyanide from Aqueous Solutions of Cyanides by Dr. Barnett F. Dodge and Walter Zabban. This report which totals eighteen pages is printed in part and will be concluded in the November issue.

For page number see Table of Contents, page 1117

Published monthly at 5800 N. Marvine St., Philadelphia 41, Pa. Entered as second class matter July 1, 1946, at the Post Office at Philadelphia, Pa., under Act of August 24, 1916. Subscriptions: Domestic and Canada, $4.00 for 1 year, $7.00 for 2 years 50c per copy; Foreign, $8.00 per year, $1.00 per copy.

NOW! EXTRA MILES OF WEAR!

AMERICAN "PERMANIZED"

NON-FRAYING
PERMANENTLY
LOCKED
FIBRES

BIAS SISAL BUFFS

ELIMINATES MANY GREASE-WHEEL OPERATIONS

Only AMERICAN Bias Sisal Buffs are made with exclusive "Permanizing" process that locks the fibres *permanently* together . . . reduces fraying . . . prevents excessive hardness . . . gives a perfect finish on every job.

Made from ALL-NEW, top-grade sisal fibre cloth, woven to our special order—bias cut. See for yourself why AMERICAN Bias Sisal Buffs out-perform—out-produce—out-wear all others on the market—ask for a demonstration right in your own plant!

NEW PATENTED "CENTERLESS" TYPE

Exclusive design runs cooler, faster—saves time with "Pre-Assembly" change-over.

Also Available PERMANENT STEEL OR CARDBOARD CENTER

Provides cool-running benefits wherever rigid center is required.

The Perfect Buff for • Carbon Steel • Stainless Steel • Aluminum Castings • Satin Finish • And Many Other Exacting Applications

American Buff Company

2414 South La Salle Street • Chicago 16, Illinois

"For the Job That's TOUGH, Use an AMERICAN BUFF"

Industry News

New Diamond Alkali Subsidiaries. Diamond Alkali Company has announced the formation of two new subsidiary companies and the election of S. S. Savage as president of the new export companies to handle its rapidly increasing volume of export sales. Diamond Alkali Inter-American Corporation will be the sales outlet for Diamond chemicals in Latin-America and other countries in the Western Hemisphere outside the United States; and Diamond Alkali International, Inc., will serve all other areas of the world.

Offices and facilities of both new companies will be at 122 E. 42nd St., New York City, N. Y.

Scholarships Awarded. Two Chicago youths have been awarded the first scholarships in the recently established Belke Manufacturing Company–Northwestern University cooperative training program. Robert Blumenthal, 19, and Gerald P. Glab, 18-year-old son of Paul Glab, secretary of the Chicago Branch of the American Electroplaters' Society, will be the recipients of the 5-year scholarships at the Technological Institute of the University in Evanston, Ill.

Bart Lectro-Clad. Bart Manufacturing Corporation, 227 Main St., Belleville, N. J., announces it is now possible to produce Bart Lectro-Clad tubing in sizes smaller than 1½ inch by depositing nickel on 1½ inch or larger tubing or pipe which is then cold reduced to desired size.

For the present, such tubing is not stocked but capacity is adequate to supply large amounts of Lectro-Clad tubing to order. In this way, wall thickness and thickness of nickel deposit can be adapted to application.

Reward Offer Continues. The Chicago Electro-Platers Institute, announced that the Institute's $2500 reward offer to stop thefts of critical metals in the Chicago area has been extended to August 31, 1953.

The reward was initiated a year ago by the Institute following a series of thirty thefts of allocated **metals** from shops of member firms. Since the reward offer was made in September, 1951, only six metal thefts have been reported.

Brushing Solves Deburring Problem. By using a wire wheel brush, manufactured by the Osborn Manufacturing Company, Cleveland, to remove a feather edge left after machining cast iron sheaves, White Motor Company, Cleveland, is now saving considerable manufacturing time and by the process also lengthens belt life considerably.

Prior to the introduction of this brushing method, this feather edge was removed by using emery cloth with the sheave rotating on a lathe. This operation, which included mounting and unmounting the sheave, took minutes. A wire wheel brush mounted on a stand grinder now does this operation in seconds, with the flexibility of the brush permitting it to blend minute surface roughness, thereby removing abrasive action on the belt.

New Grinders at National Metal Exposition. Hammond Machinery Builders of Kalamazoo, Mich., who are observing their 70th Anniversary, will exhibit at the National Metal Show, Convention Hall, Philadelphia—Booth No. 1130, two new carbide tool grinders. This will be the first exhibition of these grinders.

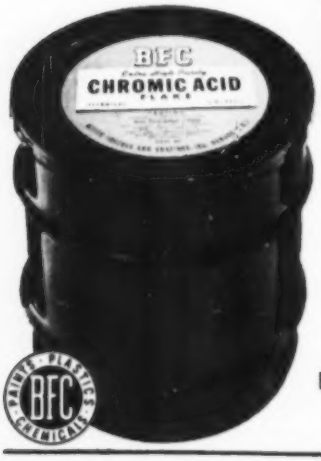
New Battelle Institute Laboratory Building. Battelle Institute, Columbus, Ohio, has broken ground for a new million-dollar "special purpose" laboratory building. The new building will be of a specially reinforced-concrete construction designed to minimize vibration, a special feature incorporated in the design, to permit the housing of electronics and other fields of research where delicate measurements are essential. The four-story brick-and-concrete structure will provide 80,000 square feet of work area in 187 unit laboratories.

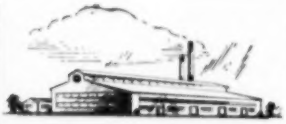
Beckman Instruments, Inc., Purchases Berkeley Scientific. The purchase of the business and assets of Berkeley Scientific Corporation, of Richmond,

EXTRA HIGH QUALITY 99.7+% PURE

CHROMIC ACID

TECHNICAL GRADE—FLAKE





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Our plant is modern; beautifully equipped; operated by men who are proud of the product they make.

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You can get a quick, unequivocal "Yes" or "No" on your Chromic Acid requirements from interested owner-principals who value your business.

We have yet to have a legitimate complaint on the quality of B.F.C. Chromic Acid. Its chemical analysis is as fine as its physical appearance!

One Price. One Standard of Quality and Service to all—whether the market is short or long. Distributor Stocks in many Principal Cities.

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268 Doremus Avenue, Newark 5, N. J.
122 East 7th St., Los Angeles 14, Calif.

WANTED

Salesman with following in conventional and bias buff line. Salary plus commission and quarterly bonus plan. All territories open. Replies held in strict confidence.

P-1052-A, PLATING
445 Broad St., Newark 2, N. J.

Anodes from ONE Dependable Source

Federated *M-Sterling Chill-Formed Copper Anodes*, made of 99.9+% high purity copper, assure electrotypers and electroplaters of a uniformly corroding copper anode. Available in all standard sizes and shapes.

Federated *Electro-Deposited Copper Anodes* are made of 99.9+% pure electrolytic copper. Available in all standard sizes.

Federated *Copper Ball Anodes* are cast of 99.9+% high purity copper in 2" paraboloids. Fit all standard containers.

Federated *Brass Anodes* are available in commonly used alloys. Made in oval and flat shapes.

Federated *Zinc Ball Anodes* are cast from special high-grade zinc in 2" paraboloids. Flat and oval zinc anodes are also available with or without full length spine.

Federated *Lead Anodes For Chromium Plating*. For decorative or hard chromium plating. Various alloys of antimonial lead and tin lead available in standard sizes and shapes.

Federated *Conducta-Core Lead Anodes*. Special type lead anodes with high conductivity. Rugged aluminum core construction assures rigidity.

FEDERATED ANODES

Federated *Tin Anodes*, made only from selected grade A prime tin. Available in 2" diameter; in 2" x 3¾" ovals in any length, with or without spines; also in special sizes and shapes with or without spine through entire length.

Federated *Cadmium Anodes*, made in 2" balls, and in 1½" x 2½" ovals with spine through entire length. CADMIUM OXIDE also available.

Federated *Tin-Lead Anodes* are available in ovals and in other shapes to order. Used by electrotypers as a direct substitute for tin foil; by bearing manufacturers; and as a protective coating.

Federated, first in the non-ferrous field, is a prime producer of top quality anode products and anode service.

Federated Metals Division

federated first in the non-ferrous field FMD

AMERICAN SMELTING AND REFINING COMPANY • 120 BROADWAY, NEW YORK 5, N. Y.

Industry News

Calif., by Beckman Instruments, Inc., South Pasadena, Calif., has been announced. The Berkeley Scientific Corporation has been dissolved and the operations will continue as the Berkeley Scientific Division of Beckman Instruments, Inc. No changes in management or personnel are contemplated.

New Distributors for Bede Industrial Products, Inc. Bede Industrial Products, Inc., Cleveland 9, Ohio, announces the appointment of the following jobbers and distributors for Bede Paint Heaters for hot spray painting:

The Payton Company, 6733 N. Olmsted Ave., Chicago 31, Ill.

Mid States Industrial Corporation, 2401 Eleventh St., Rockford, Ill.;

Finishing Equipment & Compressor Company, 1705 Grand Ave., Kansas City, Mo.; and

William D. Burke, 3972 Main St., Riverside, Calif.

New Lasalco Distributor. Lasalco, Inc., St. Louis 4, Mo., announces the appointment of the **Kaynide Division—Kraft Chemical Company,** 917 W. 18th St., Chicago 8, Ill., as their equipment distributors in the Chicago Metropolitan Area. This appointment rounds out a complete engineering and service organization for the electroplating trade inasmuch as Kaynide Division offers complete chemical and process service as well as a full line of plating equipment.

New Quarters for R. L. Hundley Company. The R. L. Hundley Company has moved to larger quarters, and is now located at 1937 W. Fond du Lac Ave., Milwaukee 5, Wis.

A production cleaning and processing set-up consisting of a series of Magnus machines

THIS UNIQUE *Batch Cleaning Machine* WAS DESIGNED FOR YOUR PRODUCTION LINE

It is powered by compressed air. It has no motors . . . no gears . . . no sprays. It eliminates overhead conveyors and hoists. It uses minimum floor space, and fits into any production line.

ON-THE-SPOT CLEANING FOR ANY DEPARTMENT

And low cost cleaning, too—for this Magnus Aja-Lif Cleaning Machine saves labor, speeds cleaning by astounding margins, and is low in first cost as well as in upkeep. As for quality of cleaning—there is nothing like it, because it gives you a mechanical "shearing" action on the dirt, plus constantly agitated cleaning solution that works faster and better.

ONE-MAN OPERATION

The Magnus Aja-Lif Machine loads and unloads at the top . . . at waist level. One lever lowers the batch, starts the machine, cuts it off and raises the batch at the end of the cleaning cycle.

FOR COMPLETE DETAILS write for Bulletin 703AL

MAGNUS CHEMICAL CO. • 41 South Ave., Garwood, N. J.
In Canada — Magnus Chemicals, Ltd., Montreal.
Service representatives in principal cities.

Magnus
CLEANERS • EQUIPMENT • METHODS

The company is a direct factory representative in Wisconsin and Minnesota for the "Pressure-Cooled" buffs and "Aircon" contact wheels manufactured by **United Buff Products Corporation,** Passaic, N. J.

Addition to Roberts Rouge Company. Roberts Rouge Company, Stratford, Conn., have started a brick and steel-constructed addition of 15,000 square feet of manufacturing space. Completion is expected in four weeks.

The new building will be furnished with the latest equipment for producing a line of compounds new in their field, announcement of which will be made soon.

Tenth Anniversary Celebration. Christmas came again in July for employees of Rapid Electric Company when the company marked the completion of ten years in the rectifier industry with a dinner-dance and the distribution of a mid-year bonus.

Operating Vacuum Metallizing Unit at Metals Exposition. The F. J. Stokes Machine Company, Philadelphia, Pa., will feature working production models of a Stokes vacuum metallizing unit and a Stokes powder metal press in its booth at the 34th National Metal Exposition and Congress in Philadelphia, Pa., on October 20–24.

Engineering Data on Uses of Lead. A new program for the preparation and distribution of engineering and technical data on the uses of lead was announced by the National Lead Burning Association.

The new N.L.B.A. program is designed to complement the Lead Industry Association's work by releasing engineering specifications and standards, adaptable to lead construction in the chemical, metallurgical, nuclear, petro-chemical, metal finishing and sulfuric acid industries.

Name Change. Sipi Metals Corporation is now the new name for Silverstein & Pitsof, Inc., well-known Chicago smelters and refiners.

Located at 1720 Elston Ave., Chicago, Sipi Metals Corporation produces copper, copper alloy and other non-ferrous alloy anodes for electroplating as well as die-casting alloys.

PLATING FOREMAN

Nickel-chrome conveyor, still zinc, copper, bonderizing. Medium size modern plant in Philadelphia area. Excellent working conditions, pay commensurate with experience and ability. Good opportunity for the right man. *Reply to:*

P-1052-B, PLATING
415 Broad St., Newark 2, N. J.

For Bright Cadmium Plating...

Du Pont "CADALYTE" PLATING SALTS and "CADALYTE" BRIGHTENER

"CADALYTE," the complete cadmium plating salt, contains all the chemicals required for a modern, efficient plating bath. Bright, lustrous deposits of high uniformity are obtained consistently with a minimum amount of attention—at surprisingly low cost.

"Cadalyte" yields extremely bright deposits directly from the bath. The bath is easy to operate, easy to maintain . . . has excellent throwing power and high cathode efficiency. A new solution can be quickly prepared by dissolving the required quantity of "Cadalyte" plating salts in water. While designed for the preparation of new baths, "Cadalyte" salts may also be used for replenishing the metal content of existing baths.

"CADALYTE" BRIGHTENER assures peak performance of the "Cadalyte" bath over any plating range. Brightener may be added separately or added with sodium cyanide in "Cadalyte" Maintenance Compound.

BRIGHTENER IMPROVES BATH PERFORMANCE 3 WAYS

1. **Maintains unusual brightness**
2. **Maintains high covering power**
3. **Maintains uniformity of deposits**

"Cadalyte" plating salts and brightener are just two of the many Du Pont plating chemicals designed to give the plating industry highest quality at lowest possible cost.

For Expert Advice and Assistance... Du Pont Technical Service

A call to our nearest district office will bring prompt, practical advice from experienced technicians in the plating field. They'll be glad to discuss your specific problems with you and make "on the spot" recommendations to help you increase plating efficiency.

For further information and literature on Du Pont Plating Chemicals, send in the coupon below. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington 98, Delaware.

We can supply your cadmium anode requirements from conveniently located stock points in 11 principal cities. Contact our nearest district office for information on prices and deliveries.

DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati • Cleveland • El Monte (Calif.) • New York • Philadelphia

Chemicals . Processes . Service

for **ELECTROPLATING**

DU PONT

REG. U.S. PAT. OFF.

150th Anniversary

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.),
Electrochemicals Dept., Wilmington 98, Del.

Please send me complete information on Du Pont Plating Chemicals—properties, advantages and recommended procedures. I am interested in the following types of plating:

☐ **Cadmium Plating** ☐ **Tin Plating**
☐ **Copper Plating** ☐ **Zinc Plating**

*Name*_____ *Position*_____

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*City*_____ *State*_____

Saran rubber at work—saran rubber is used as a membrane under one course of chemical brick in these ethyl benzene reactors. The reactors handle ½ ethyl benzene, ½ higher benzenes, ½ benzene and 3% hydrochloric acid, and operate at a temperature of 110° C. Although this exceeds the temperature recommended for saran rubber, the towers have been in service three years without appreciable change in the saran rubber lining.

BOOST EQUIPMENT LIFE!

use

SARAN

RUBBER TANK LINING!

Saran rubber combines the physical properties of rubber with the chemical resistance of saran. The resulting high degree of chemical and abrasive resistance makes saran rubber an outstanding lining where resistance to grease, many solvents, acids and other chemicals is indicated.

Industries handling, storing or transporting corrosives find that saran rubber tank lining helps achieve lower operating costs and increase the life expectancy of costly equipment. Saran rubber is easy to apply; experienced tank lining applicators are located throughout the country. For further information contact your nearest Saran Lined Pipe Company office.

for tank cars
storage tanks • tank trailers
processing tanks
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RELATED PRODUCTS

Saran rubber molded parts—stoppers, diaphragms, various-sized moldings for valves, instruments, etc.

Saran lined steel pipe—corrosion-resistant pipe that gives long-term operation with minimum maintenance costs.

Write to the Distributor:

SARAN LINED PIPE COMPANY

2415 BURDETTE AVENUE • FERNDALE, MICHIGAN

Offices in: New York • Boston • Pittsburgh • Tulsa • Philadelphia Chicago • Portland • Indianapolis • San Francisco • Houston • Denver Los Angeles • Seattle • Cleveland • Charleston, S.C. • Toronto • Montreal

Saran Lined Pipe Company
2415 Burdette Avenue, Ferndale, Michigan

Please send me your catalog on Saran Rubber Tank Lining and Saran Rubber Molding Stocks.

Name _____ Title _____

Company _____

Address _____

City _____ State _____

SR-512-B

SARAN RUBBER

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product

Society News

A. S. A. Meeting

Agreement on six methods of testing steel and steel castings has been reached by a 13-nation technical committee meeting at Columbia University.

The International Organization for Standardization announced that the test methods agreed on by the committee are the Rockwell, Brinell, and Vickers (Diamond Pyramid) tests for hardness, the Bend test, and the Izod and Charpy impact tests.

The Electrochemical Society Meeting

The fall meeting of the Electrochemical Society, Inc., will be held at Montreal during the period October 26-30, 1952 and will include five half-day sessions on electrodeposition.

On Monday, October 27 there will be a full-day session on the electrodeposition and polishing of copper. Tuesday morning there will be a general session on electroplating processes. Wednesday morning there will be a joint session with Industrial Electrolytic on electrowinning and electrorefining, and Wednesday afternoon a session on the plating of unusual metals.

Change of Address

The Institute of Metal Finishing incorporating the Electrodepositors' Technical Society reports a change of address. The new offices of the Institute are situated at 32, Great Ormond Street, Holborn, London, W. C. 1., England.

Tin Research Institute

The International Tin Research and Development Council has adopted a new name and is now known as The International Tin Research Council. This change will not affect the policy of the Council nor alter its current activities.

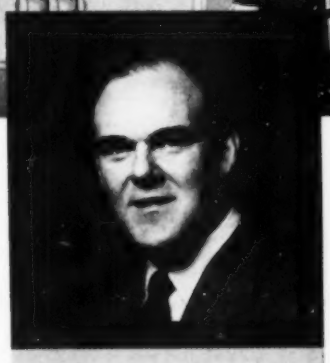
Library Service at the National Metals Exposition

The Special Libraries Association will reproduce a working library at the National Metal Congress at Philadelphia, October 20-24 in Booth No. 1020. A metals librarian in constant attendance will quickly locate the answers to reference questions by visiting metallurgists and scientists. New books and periodicals will be on display.

American Society of Tool Engineers

The 100th Chapter of the American Society of Tool Engineers, this year celebrating its 20th anniversary, will be chartered in Memorial Hall in Athol, Mass., on October 14, 1952. An extensive program has been planned for the chartering affair which marks a milestone in the growth of the A.S.T.E., whose membership swelled to over 22,000 members.

"LET UDYLITE SAY WHATEVER THEY WANT ABOUT OUR INSTALLATION —IT HAS LIVED UP TO ALL CLAIMS."



LEW WENGERT

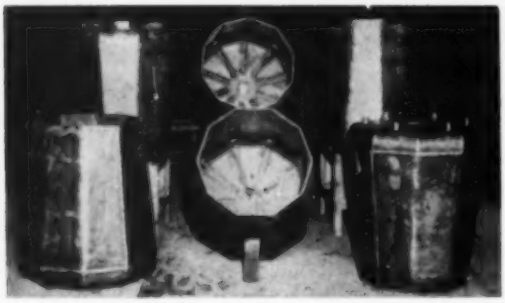
Says Lew Wengert, Plant Superintendent of Utica Drop Forge & Tool Corporation

That was the reply we got when we asked Mr. Wengert, superintendent of the Yorkville plant of the Utica Drop Forge & Tool Corporation, about the Udylite Rotary Full Automatic in that plant. The machine is used for processing jet engine parts.

Mr. Wengert's enthusiasm is typical of Udylite customers. He has found, like many other users, that Udylite lives up to the claims made by our salesmen. The Udylite organization owes its progress and growth to the guiding principle of being honest with its customers. So, if you're in the market for equipment and supplies for a "better way in plating", it will pay you to look to Udylite. Call in your Udylite Technical Man today and let him tell you the complete story. Or write to The Udylite Corporation, Detroit 11, Michigan. *There's no obligation.*

THE *Udylite* CORPORATION
DETROIT 11, MICHIGAN

PIONEER OF A BETTER WAY IN PLATING



Stortswelding makes tough tumblers

Your tumbling barrels can be just as husky, tough and durable as you want them to be, without a pound of excess weight—if you specify Stortswelded construction. Barrels like these will stand up to the repeated heavy duty over long periods of continuous service.

42 STONE STREET — STORTS WELDING COMPANY INCORPORATED — MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1210.

*Are Your Coatings...** TOO THIN? TOO THICK? NON-UNIFORM?

* PLATINGS - PAINTS - ENAMELS - FILMS

THE AMINCO-BRENNER

MAGNE-GAGE gives the answer . . .

- **RAPIDLY**
- **ACCURATELY**
- **NON-DESTRUCTIVELY**

The Aminco-Brenner Magne-Gage is widely used for measuring the thickness of:

1. Non-magnetic material on nickel which is or which can be backed by iron or steel.
2. Nickel which is or which can be backed by non-magnetic material.

WRITE FOR BULLETIN 2150-V

AMINCO *Laboratory Instruments*

AMERICAN INSTRUMENT COMPANY, INC.

Silver Spring, Maryland • In Metropolitan Washington, D. C.

Personals

Louis V. Gagnon has been appointed Massachusetts' Sales Representative for Frederic B. Stevens, Inc., and will work from the company's New England Branch at New Haven.

Gagnon

Before joining Stevens he was employed as a control chemist and buffing and polishing foreman, as a superintendent of electroplating, and as a representative of the Bart-Messing Corporation.

Gagnon attended Tufts College and Lowell Institute School of M. I. T., and has held various offices in the Boston Branch of the American Electroplaters' Society.

Clifford R. Palkie has joined the staff of United Chromium, Inc., as Assistant Sales Manager of their Organic Coatings Division. Supervision of sales of vinyl

Palkie

chlorinated rubber, and phenolic coatings in the line of Ucilon Protective Coatings will be his immediate assignment.

Included in Mr. Palkie's experience in the protective coatings field are 6 years with the Corrosite Corporation.

Robert H. Tiers has been appointed Chief Chemist for the W. D. MacDermid Chemical Company, Bristol, Conn.

Mr. Tiers is a graduate of the University of Connecticut with a B.S. degree and has had graduate work at the University of Connecticut and the University of Pennsylvania. He was employed from 1933 until 1944 by Pratt & Whitney Aircraft Division of The United Aircraft Corporation, beginning as Control Chemist and advancing to an advisory position on the General Manager's staff. From 1944 to 1952 he was employed by the Pennsylvania Salt Manufacturing Com-

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Greatest Advance in GOLD PLATING HISTORY!

Sel-Rex®

BRIGHT GOLD PROCESS

The World-Famous Sel-Rex SILVER SOL-U-SALT

Now widely used as standard by the largest silver platers in the country. Not one user of Sel-Rex Silver Sol-U-Salt has changed back to his former old fashioned silver cyanide process.

SILVER SOL-U-SALT is a water soluble double cyanide salt. It is a pure white crystalline free-flowing salt of known and definite chemical composition.

- Dustless, eliminating hazard of other type air-borne powders.
- No filtering, calculating or mixing necessary.
- Eliminates waste.
- No rough deposits.

Available in 100, 200, 500, 1,000 and 2,000 ounce plastic packages.

Sel-Rex® *Exclusive Developments of*

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The only successful BRIGHT GOLD PROCESS on the market that operates at room temperatures.

It is the simplest BRIGHT GOLD plating bath—requiring absolute minimum control and no flash or strike.

Produces mirror-like deposits regardless of thickness, without any need for scratch brushing or buffing. (No loss of gold.)

100% cathode efficiency permits easy calculations for cost and specification plating.

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Personals

pany, eventually heading the Research and Development Administrative Staff, pertaining to the development and manufacturing of the metal cleaning division.

In his present capacity he will supervise experimental and development work at the company's laboratory, and also will be available for consultation and service work in the field.

Walter S. Schamel has been appointed district manager of the Los Angeles office for American Wheelabrator & Equipment Corporation, with offices at 3155 Leonis Blvd., Vernon, Los Angeles 58, Calif.

He has been in the company's dust and fume control division at the home office for the past 6½ years, first as sales engineer and most recently as assistant technical director. He is a civil and mechanical engineering graduate of the Missouri School of Mines and Metallurgy.

Louis V. Feldman has been appointed Technical Director of the Division Lead Company, Chicago, Ill.

Formerly Research Project Engineer with Continental Can Company, he received a Bachelor of Science degree in Chemical Engineering from Illinois Institute of Technology, and a Master of Business Administration from the University of Chicago. A specialist in solders, fluxes and alloys, he holds several patents on special and non-corrosive soldering fluxes.

P. H. Douwenga, member-at-large, A. E. S., has moved from the Netherlands to Germany where he is finishing engineer and chief plating chemist for Kronprinz A. G. at Solingen-Ohligs which manufactures precision tubing, motor car wheels, mud guards, etc.

Frank J. Kiernan has been appointed sales engineer by the U. S. Stoneware Company, Akron, Ohio, and will make his headquarters at the company's New York office at 60 E. 42nd St.

Kiernan

Kiernan received the degree of Bachelor of Science in Chemical Engineering at the University of Detroit, and is a member of the American Institute of Chemical Engineers and Chemical Engineers of Greater New York. He has had wide experience in chemical processing, having specialized in the field of organic and fine chemicals.

Leon A. Kolker, founder and president of the Kolker Company, subsidiary of the Diamond Alkali Company, has announced his retirement.

The activities of the Kolker concern will now be carried on by **J. G. Brunton,** in charge of Kolker sales, and **Charles H. Kolker,** in charge of operations and engineering. The functions of these two men will be coordinated under **A. L. Geisinger,** Diamond Alkali Vice-President in charge of the Organic Chemicals Division.

Obituaries

✣ **James J. O'Shea,** Vice-President and Sales Manager of the Alsop Engineering Corporation, Milldale, Conn., and member of the Hartford Branch of the American Electroplaters' Society, died Tuesday, August 19, after a brief illness.

A pioneer in the field of industrial mixing and agitation he had been with the Alsop Engineering Corporation for eighteen years. One of his developments was an agitator unit widely used during World War II in the electro plating of bearings for air craft engines.

✣ **Louis A. Gale,** former superintendent of the Razor Division of Gillette Safety Razor Company and a member of the Boston Branch A. E. S., passed away on July 27, 1952. Mr. Gale returned to Boston from retirement in Florida for diagnosis in March, but failed to recover from Hodgkin's disease which afflicted him. Active in the A. E. S. for a long time, his many friends mourn his passing.

COUNSELOR IN METAL CLEANING AND SURFACE TREATMENT FOR—

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Carter Carburetor Corp.
Cummins Engine Company
Delco Remy Division, General Motors Corp.
Electric Auto-Lite
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At your service if you are located in his territory.

Mel has merited the confidence of many of America's leading metal processors through his long-trained skill of devising most efficient methods for metal cleaning and surface treatment. His own obility augmented by 170 years of specialized experience by the Ransohoff engineering staff is a big reason why Ransohoff tailored-to-the-job metal cleaning and surface treatment equipment is top choice of the "who's who" among metal working industries.

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8 REASONS-

why FLAT·TOP is here to stay

WE know our Copper FLAT·TOP was one of the answers to a plater's prayer when we introduced it in 1950. Now, you progressive plating men all over the country have *tried* FLAT·TOP—and found it TRUE. Its acceptance as the standard premium anode is almost universal. The reasons why are sound:

1. FLAT·TOP is Smooth! No gates or flash to hang on basket. No cavities to hide inclusions of copper oxide, silica or dirt.

2. FLAT·TOP has Greater Area! From 20 to 25% more effective area than a ball. More weight of metal per anode means less frequent loading.

3. FLAT·TOP is Pure! Manufactured from the highest purity copper available, under controlled conditions which prevent contamination during production.

4. FLAT·TOP is Efficient! No more troublesome and costly scrapping of unusable "swards" and hooks. Used completely, no scrap.

5. FLAT·TOP is Predictable! Eliminates rapidly changing anode area as bars corrode, decreasing sludge formation and rough plating.

6. FLAT·TOP is Ready! No waiting, no extra handling, no extra costs of fabricating and attaching hooks. Load your baskets right from the keg.

7. FLAT·TOP is Clean! NEW durable wooden kegs, free from foreign matter found in used metal containers, keep FLAT·TOP clean!

8. FLAT·TOP is Convenient! Safe to stack, easy to roll or truck from storage to plating department. 250 lbs. net.

Talk over your copper problems with the Wagner man in your area. He's qualified to give you valuable assistance and information on other Wagner products for efficient plating and polishing. If you prefer, just use the coupon below.

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Trade Literature

L—880. New Catalog No. 72—The Hisey-Wolf Machine Company, Cincinnati 8, Ohio, announce the publication of a 34-page catalog which describes many improvements, modifications and additions to their line of grinders and buffers. For your copy use Reader Service Card.

L—881. Vacuum Processing Systems Catalog—A revised edition of the 12-page catalog on "Complete Vacuum Processing Systems" has just been released by the F. J. Stokes Machine Company, 5500 Tabor Rd., Philadelphia 20, Pa. Principal changes are new sections on Vacuum Metallizing and Vacuum Furnaces. Copies of the catalog No. 730 may be obtained by using Reader Service Card.

L—882. Brochure on Use of Platecoils—The how and why of the savings made by Platecoils in typical installations at thirteen different companies in heating and cooling processes are described in detail in a new 20-page brochure just released by the Kold-Hold Manufacturing Company, Lansing, Mich.

Lower initial cost, faster heating or cooling, and requiring half as much tank space as pipe coils, the use of Platecoils thus produces significant cost reductions. Copies of this new brochure may be obtained by using Reader Service Card.

L—883. Strategic Materials Surveys—Publication of four major studies of strategic materials—covering antimony, asbestos, lead and nickel—is announced by the National Security Resources Board.

Originally intended primarily for official use within the government, they were completed between March, 1951, and April, 1952, but because of wider interest they are being made available to the public through the Superintendent of Documents, Sales Office. They are priced as follows: antimony $1.25; asbestos $1.75; lead $3.50 and nickel $2.00. A volume on zinc will be published in the near future.

L—884. Surface Active Agents Bulletin—Prepared as a guide to speed processing and lower production costs, a new 8-page bulletin, "Surface Active Agents for the Metalworking Industry", has recently been issued by E. F. Houghton & Company, of Philadelphia.

A chart outlining the physical properties of the leading surface active agents in Houghton's line serves to help in selecting the proper product for various needs. For a free copy use Reader Service Card.

L—885. Liquid Carburizing Salts—An informative new folder on Swift Polytherm Blended Liquid Carburizing Salts is now available. The folder points out that these metal treating salts afford the distinct advantages of Swift Polytherm Blending as well as the simplified quenching and adaptability of standard liquid baths.

Under all conditions, Swift carburizing salts assure increased speed, greater uniformity of case depth and more durable finishes in any liquid carburizing equipment. Copies of this informative folder may be had by using Reader Service Card.

L—886. Branson "Coatingage" Catalog—A six-page folder describing theory and operation of the "Coatingage" model 600 has been released by Branson Instruments, Inc., Stamford, Conn.

This portable instrument is used to measure the thickness of non-magnetic coatings on magnetic bases, and to detect pin-holes in non-conductive coatings on conductive bases. Copies of the Coatingage folder are available. Use Reader Service Card.

L—887. Dermatitis Control Booklet—The West Disinfecting Company, Long Island City 1, N. Y., has issued a new 32-page booklet, "The Control of Dermatitis in Industry". According to industrial physicians, 90 per cent of industrial dermatitis cases can be prevented by proper cleansing materials and methods, and correct supervision and instruction.

The new booklet presents a simple, inexpensive prevention and control program. A six-page chart covering a wide range of industries lists various working conditions, types of dermatitis prevalent where these conditions exist, and suggested preventive measures for each. Brief de-

Extra ways to save with Coating 218X

NOTHING BETTER FOR RACKS . . .

Users of Coating 218X know this green plastisol can't be beaten for rack protection. They've seen it stand up in all plating and anodizing baths, the toughest cleaners, even vapor degreasing cycles. Bumps, abuse, abrasion—all taken without damage by this flexible, shock absorbing, thick coating. In short, it gives them more rack protection, with less maintenance, and therefore the least cost.

As on racks, a single application of Coating 218X will give outstanding protection and eliminate need for frequent maintenance on:

- dipping baskets
- drain boards
- conveyor hooks
- tote boxes
- anode hooks
- tank linings
- plating barrels
- flexible cable
- hand tools
- heat exchangers

Coating 218X will work for you in more ways than one—to save money, equipment, time. Ask us about it.

UNICHROME COATINGS for METALS
Metallic ..... Organic ..... Decorative ..... Protective
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Complete Installations

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CRANE OR MONORAIL

EXTREMELY FLEXIBLE
FREE OF MAINTENANCE
MINIMUM INITIAL COST
CYCLE CAN BE EASILY CHANGED

For your next installation, let us furnish you with a complete proposal, including blueprints detailing floor plans employing this method of transfer.

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POLISHING AND PLATING EQUIPMENT

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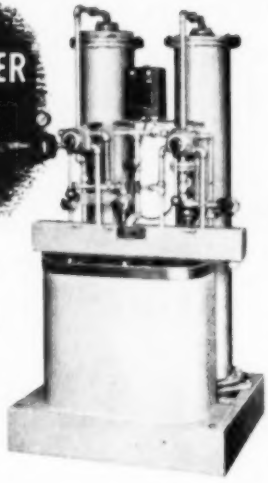
CHEMICALLY PURE WATER
is Cheap

only a few cents a thousand gallons

with **INDUSTRIAL**
Water Demineralizers



A two-bed INDUSTRIAL demineralizer unit. Standard units are available with capacities of 200 to 1000 gph. Special units of any capacity are engineered to requirements.

Eliminate UNWANTED PRECIPITATES HOT WATER RINSE STAINS

These two difficulties in plating can be eliminated with one stroke—chemically pure water. Pure water in plating solutions improves the over-all quality of plated coatings. The use of pure water for hot rinses prevents stains and water marks after drying. With an INDUSTRIAL demineralizer chemically pure water costs so little that the unit pays for itself in a short time. It's easy to install and operate, and requires very little floor space.

Write for Bulletin 200

or send us a water analysis, letting us know the amount of treated water required in gallons per hour, and whether intermittent or continuous flow is needed. We will then give you the whole demineralizer story, including estimated cost, equipment required, performance data, etc. for your requirements.

for solution clarification . . .

INDUSTRIAL Filters

A typical INDUSTRIAL stationary filter. Standard portable and stationary models are available with capacities 100 to 15,000 gph. Special filtering systems are engineered to meet unusual requirements.

Write for Full Information and Recommendations

FILTERS Pressure Type · PUMPS Centrifugal · CORROSION TESTING APPARATUS Salt Fog • Humidity

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RUBBER DIVISION Vulcanized Linings • Molded Products · WATER DEMINERALIZERS

Trade Literature

scriptions of typical industrial skin troubles are included. Copies of the booklet may be obtained by using Reader Service Card.

L—888. Literature Available—Unichrome Dip and Anozinc Processes for producing corrosion-resisting, chromate conversion coatings are described in literature now available from United Chromium, Incorporated. Unichrome Dips produce clear, yellow, olive drab, brass-color, and black coatings on zinc and cadmium by simple chemical action. The Anozinc process is an electrolytic one used to produce clear, yellow, and black conversion coatings on zinc. For your copy of the literature use Reader Service Card.

L—889. Cathode Potential, Efficiency and Throwing Power of Nickel Plating Solutions—A reprint by the International Nickel Company, Inc., 11 pages—8 tables and charts presents technical data on properties affecting throwing power for nickel chloride, hard nickel and Watts' plating solutions. Cathode potential, cathode efficiency, resistivity and metal distribution ratios for the several baths are given and behaviors are compared. Data were obtained under same plating conditions for direct comparison. For your copy use Reader Service Card.

L—890. Lubrication Process for Cold Extrusion—A new phosphate coating and lubricating process, identified as Extrudite, which makes possible the cold extrusion and forming of steel is fully described and illustrated in an 8-page booklet issued by the Detrex Corporation, Detroit 32, Mich. For a copy of the booklet on this process, which is applicable to both carbon and stainless steels, use Reader Service Card.

L—891. New Etchant for Aluminum—Oakite Products, Inc., New York, have announced the development of Oakite No. 60, a material designed to produce a heavier, more uniform etch on aluminum.

Reported advantages in aluminum-etching operations by use of this material are: rapid etching; no hard scale build-up; consistent, uniform etching without excessive foaming or fuming; long working solution life; and easy working non-clouding solutions. After etching, parts rinse readily in cold or hot water. Additional information regarding this material is provided in a special service report. Use Reader Service Card.

L—892. Orlon Industrial Uniforms Catalog—A 16-page catalog featuring new styles of Orlon industrial uniforms has just been prepared by Werklon, Inc. Copies of the book, illustrated in color and with full technical data and complete

55 PAGES OF FACTS ON HOW TO CUT YOUR SMALL PARTS FINISHING COSTS

Now you can get up-to-the-minute news on the very latest developments in barrel-finishing — the fast, modern, economical process that deburrs, removes scale, tool marks and flash, and produces surface finishes and radii to blueprint specifications.

Norton Company's brand new booklet covers the subject thoroughly in 55 liberally illustrated, fact-filled pages — describes in detail every phase of barrel-finishing — tells you what to do, *and what not to do*, for best results.

PARTIAL LIST OF SUBJECTS

TYPES OF EQUIPMENT . . . CLEANERS . . . ROUGHING . . . RUST PREVENTIVES . . . FINISHING . . . PROCESSING OF SAMPLES . . . SEPARATION OF WORK FROM ABRASIVE . . . WASHING . . . DRYING . . . RESCREENING OF ABRASIVE . . . MIXING DIFFERENT PARTS.

GET THIS MONEY-SAVING INFORMATION

The new booklet also tells you how Norton ALUNDUM* tumbling abrasive — especially developed to meet industry's wartime needs for fast, efficient small parts finishing — has become a standard barrel-finishing medium in plants throughout the country.

Learn how this tough, hard abrasive helps you to shorten tumbling cycles, reduce scrap and reworking, and gives you consistently better finishing of parts ranging in size from tiny rivets to larger castings. Ask your Norton distributor or representative for your free copy of "Barrel-Finishing With ALUNDUM Tumbling Abrasive," or write us direct.

NORTON COMPANY, WORCESTER 6, MASS.

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NORTON
ABRASIVES
Making better products to make other products better

Trade Literature

test results on the remarkable acid and chemical resistance of these new garments, are available. Use Reader Service Card.

L—893. Safety in Chromic Acid Handling—Recommended practice for the handling and use of chromic acid is given in Chemical Safety Data Sheet SD-44 recently published by MCA. Proper methods for shipping, labeling, storage, unloading, and emptying containers are described. Personal protective equipment, employee education, and instructions for physical examination and medical treatment are also outlined.

Copies of the safety data sheet may be obtained from the Manufacturing Chemists' Association, Inc., Woodward Bldg., 15th and H Sts., N. W., Washington 5, D. C., or use Reader Service Card.

L—894. New Literature Available—United Chromium, Inc., has issued a new bulletin RC-2, describing the properties and uses of Unichrome Coating 218X, a vinyl plastisol material suitable for coating plating and conveyor racks, degreasing and dipping baskets, plating barrels, drainboards, ductwork, agitators, tank grids, piping, tanks and drums, and other equipment. Copies of this bulletin may be obtained through use of Reader Service Card.

PAINT STEEL

CLEAN OR RUSTED

WET OR DRY

WITH

TYGORUS

TYGORUST is the new "no-prep" vinyl primer that adheres tenaciously to steel and iron — clean or rusted — wet or dry. It applies easily by brushing or spraying. It covers up to 600 square feet per gallon. It dries hard in minutes. It can be top-coated in an hour, or less. It provides excellent adhesion for all types of finishes. It inhibits rust formation. It has good chemical resistance.

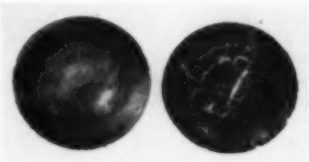
TYGORUST can also be used to prime concrete, wood, and previously painted surfaces (asphaltic coatings excepted). It is particularly recommended as a primer for chemically resistant, vinyl-based coatings.

For minimum surface preparation, use TYGORUST! For maximum chemical resistance, use TYGORUST top-coated with TYGON "Series TP" Paint!

WRITE TODAY FOR FULL DETAILS!

THE U. S. STONEWARE CO.
Plastics and Synthetics Division
AKRON 9, OHIO

L—895. Improved Resin for Chemical Resistant Cements—An entirely new and vastly improved resin used as a chemical resistant cement which provides higher tensile strength and less shrinkage, and improved resistance to oxidizing solutions with better water and thermal stability, has just been announced by the Irvington Varnish and Insulator Company, Irvington, N. J.



Known as Fura-Tone 1347, it will not crack, check or warp and also exhibits a notable improvement in shrinkage. For your copy of technical data sheets on this new material use Reader Service Card.

L—896. New Spectrophotometer Applications Bibliography—A helpful new bibliography of applications for the Beckman Models B and DU Spectrophotometers is now available. More than 500 specific sources of application data for these well-known analytical instruments are listed.

Copies of this new publication may be obtained by using Reader Service Card.

L—897. New Table of Detection Limits for Spectrophotometers—A table of detection limits of more than 20 metals for the Beckman Models B and DU Flame Spectrophotometers has been published by Beckman Instruments, Inc., South Pasadena, Calif. The sensitivity of these instruments makes precision detection possible, and this new table lists in simplified tabular form the most useful wavelengths for flame photometry detection of such elements as barium, boron, calcium, potassium, sodium, manganese and many others. Copies may be obtained by using Reader Service Card.

L—898. Quick Drying Enamel—The Wilbur & Williams Company, Boston 35, Mass., announce a new type of enamel that is a free-flowing, extremely high gloss, tough enamel, highly resistant to chemical fumes and yet dries in a matter of minutes, thus placing it in a drying competitive field with lacquers.

Brochures showing the colors available with full information as to uses may be obtained by using Reader Service Card.

Cowles AM

A non-etching type aluminum cleaner for use in soak tank cleaning. It was specifically designed to remove drawing, stamping, spinning compounds, rolling oils, marking inks, crayon marks and shop dirt from common aluminum alloys prior to spot welding, anodizing or other finishing operations.

for better aluminum cleaning and deoxidizing

Cowles DO

A powdered acid type deoxidizer designed for efficient removal of the oxide film from aluminum prior to spot welding, anodizing or chromate finishing. It inhibits rapid reoxidation. DO solutions dissolve primary film rapidly, then reoxidize the metal surface slowly and uniformly with an air-stable oxide film without leaving smut residues.

Write for Technical Data Sheets on Cowles AM and DO Cleaners
Prompt Shipments from Convenient Warehouse Stock

Cowles Technical Service Gladly Furnished Upon Request

COWLES CHEMICAL COMPANY
METAL CLEANER DEPARTMENT
7016 Euclid Avenue • Cleveland 3, Ohio

Equipment and Supplies

E–950. Lubricant for Dead Center Lubrication—Molykote-Centerlube, a new lubricant for dead center lubrication wherever loads and speeds are beyond the capacity and temperature ranges of conventional center lubricants, has been announced by The Alpha Corporation, Greenwich, Conn. The basic ingredient is a lubricating grade of molybdenum disulfide powder which will bond a lubricating film on bearing surfaces and impart the low friction and anti-seizing properties necessary to resist extreme bearing pressures and temperatures. The excellent adhesive and lubricating qualities of Molykote-Centerlube are the direct result of the full utilization of the unique molecular structure of this combination of molybdenum and sulfur. For complete details, use Reader Service Card.

E–951. Coolant Pump Magnet—After extensive testing with as many as 50 units in one plant, the Magnetool low-cost Coolant Cleaner is now ready for general distribution on 10-day trial order basis. It is highly recommended for tool room grinders and lathes, or for light production drilling and tapping. It is not for heavy production grinding. The powerful magnetic unit 1 1/8 inch dia. by 8 inches long is easily suspended under pump intake in coolant tank. All floating steel particles are trapped by the magnet instead of being pumped back into the system to damage work and tools. The unit accumulates a mass of chips 4½ inches long and 1 inch thick around its entire circumference. Load is removed simply by pushing wiper ring to opposite end of tube. For further information, use Reader Service Card.

E–952. Three-Point Suspension Plating Barrel and Plastic Tank—A plating barrel with three hanger studs instead of four, and plastic plating tanks were demonstrated at the 1952 Industrial Finishing Exposition by Belke Manufacturing Company, 947 N. Cicero Ave., Chicago 51, Ill.

The improved barrel design has two hanger studs at the drive end and one at the other end. The three-point suspension prevents rocking which ordinarily occurs when plating barrels have two hanger studs at each end.

The plastic plating barrels, exhibited for the first time, were used in a plating exhibit operated by Belke for the Chicago Electro Platers Institute in the production of plated metal finishing.

E–953. New Electric Radiant Heat Panels—New Chromalox Electric Radiant Panels are described in an illustrated six-page bulletin just published by Edwin L. Wiegand Company, 7686 Thomas Blvd., Pittsburgh 8, Pa.

The panels ideally suited for rapid infra-red oven construction at low cost per kilowatt, have listed various dimensions, ratings, and intensity controls in Bulletin CS-605. For your copy, use Reader Service Card.

E–954. Dust Collector—Added to its line of industrial dust and vapor collectors by Aget-Detroit Company, Ann Arbor, Mich., is the Model 30ND50 DUST-KOP dust collector which provides for outside exhaust of cleaned air.

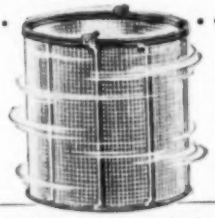
Having a rated capacity of 3,630 cfm at 6 inch static suction on an 8 inch diameter pipe, the unit employs a standard size cyclone separator, and has a dust storage capacity of 12 cu ft.

Supplied as standard equipment is a 5 hp motor, for operation on either 220 or 440 volt, 3 phase, 60 cycle power, together with a thermal overload protected manual starting switch. Shipped complete from stock requiring no assembly at destination, the unit is recommended for

PAYS FOR ITSELF... IN TIME SAVED

Kreider Dryer with auxiliary steam heating unit (illustrated). Auxiliary natural gas heating unit available; also standard model without auxiliary heating.

Basket (below). Heavy gauge woven steel mesh over steel frame. Capacity, 1140 cu. ins.



Spin-Dries* up to 50 pounds in less than 2 minutes

Saves drying time. Kreider Dryer operates on ¾ h.p. at 625 r.p.m. . . . cuts drying time to as little as 35 secs.—no more than 2 mins.—for each 50 lbs.

Saves production time. Runs at top speed with maximum load, hour after hour, day after day. Ends drying "bottle necks" . . . assures smooth, evenly dried surfaces, longer lasting lustre—fewer "rejects."

Saves maintenance time. Simple, sturdy construction reduces "time-outs" for repairs and servicing to a minimum. Assures long life.

See for yourself! Write Department PL 1-2 today for illustrated 4-page folder . . . also addresses of installations near you.

New Holland Machine Co., New Holland, Pa.

*Only 2 simple steps required . . .

(1) Operator places wire mesh basketful of small parts in Dryer . . . turns motor "ON."

(2) Operator turns motor "OFF" . . . presses foot brake . . . removes basket.

NEW HOLLAND KREIDER DRYER

ECONOMICAL CONTROLS are conveniently located near where power is used, regulate d-c output of rectifiers by controlling a-c input.

STEADY PRODUCTION continued during the expansion. Engineer C. A. Lefever and worker H. A. Lease are examining screen as it leaves galvanizing process.

SPACE SAVING G-E plating rectifiers can be tiered. Since no special foundations are required, units are easily added as load grows.

New York Wire Cloth Co. spearheads 50% expansion with G-E plating rectifiers

Skyrocketing demand for its Opal screening recently forced the New York Wire Cloth Company of York, Pennsylvania to expand its manufacturing facilities by 50%. G-E metallic plating rectifiers played an important part in this expansion.

The company's experience with G-E metallic rectifiers goes back to 1947 when five 2000-ampere units were installed to replace a power supply for galvanizing. These units proved so satisfactory that New York Wire Cloth standardized on them for future replacements and expansion.

Since that original installation, 24 additional 2000-ampere cubicles have been installed, providing power for electrolytic cleaning, plating and galvanizing. Mounted in tiers, in ventilated rooms removed from actual plating operations, they occupy little space, and require almost no maintenance.

Engineer C. A. Lefever says: "One of the finest features of these G-E metallic rectifiers is that once installed, they function perfectly without continual checks . . . I have been able to devote all my time to other expansion problems."

You, too, can profit from the easy maintenance, stable electrical characteristics, and extremely long life of G-E metallic plating rectifiers. For further information, contact your nearest authorized G-E plating agent, or write to Section 464-10, General Electric Company, Schenectady 5, New York.

EASY TO MAINTAIN. Plant electrician S. L. Ellsworth inspects and cleans G-E metallic plating rectifiers only once or twice each year.

GENERAL ELECTRIC

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1222.

SPARKLER FILTERS · SPARKLER FILTERS

Can you afford to buy a low-priced plating filter?

In many instances the first cost of a Sparkler filter will exceed that of some other types of plating filters.

But the savings in operating cost soon will more than make up for the difference, and you will find your Sparkler a good investment both on the basis of cost and quality of performance.

SEE SPARKLER FILTERS, BOOTH 1875, NATIONAL METALS EXPOSITION

For example:

★ Pre-coating Sparkler horizontal filter plates requires only about one-third the amount of filter aid used by some other filters.

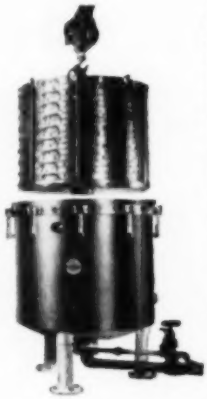
★ Only a thin pre-coat is necessary, and you can get brilliant sharp clarity right from the start.

★ Intermittent operation of the filter will not break up the cake on horizontal plates. No renewal of pre-coating is necessary after a period of inactivity.

★ A wide range of fineness of filter media is possible with Sparkler filters.

★ Sparkler filters are ideal for alloy plating solutions. Non-metallic filter plates and rubber lined tanks are available when required.

These are a few of the many operating advantages that make Sparkler plating filters the most economical in labor and material cost and most satisfactory from a standpoint of filtering quality.



An extra set of plates that can be changed in a matter of minutes cuts "down-time" to a minimum.

Sparkler representatives in all principal cities are available for personal service on your filtering problems.

SPARKLER MANUFACTURING CO.
Mundelein, Illinois

Sparkler International Ltd.
Prinsengracht 876, Amsterdam, Holland

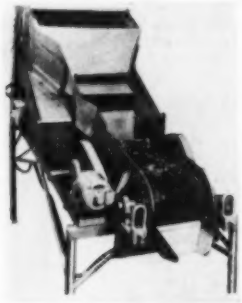
Kamther & Co.
35 Chittaranjan Ave., Calcutta 12, India

Sparkler Western Hemisphere Corp.
Mundelein, Ill., U.S.A.

Equipment and Supplies

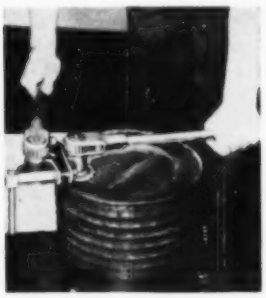
grinding, buffing or polishing wheels, surface grinders, woodworking machines, etc. For further information use Reader Service Card.

E—955. Roto-Finish Develops Combination Separator—The Roto-Finish MMG 34-12, a combination mechanical-magnetic separator, is especially designed to separate parts from Roto-Finish abra-



sive chips where both ferrous and non-ferrous parts are being processed. The unique feature of the unit is that the magnetic and mechanical separating mechanisms are interchangeable on the portable frame. As a result, it can be used either as a mechanical or magnetic separator in a simple and efficient manner. For complete information on this equipment use Reader Service Card.

E—956. Drum Head Cutter—The M. A. Schinker Manufacturing Company, Chicago 36, Ill., announces a new speedy, light weight, hand operated head cutter



called the Model 600. It was especially designed to cut out the tops of heads of Carbide, Caustic Soda, Cyanide and other "one-time-shipper" drums and cans of 24 to 30 gauge metal.

The principal feature of this head cutter is that after the cut is completed the container will have a safe, "turned-in" flange

try these

Schaffners

POLISHING·BUFFING COMPOUNDS

GIVE WINGS TO WORK

CHROME COLORING ROUGE
TRIPOLI COMPOUNDS
JEWELERS ROUGE
GREEN ROUGE
CROCUS COMPOUND
STAINLESS STEEL COMPOUNDS
ALUMINUM BUFFING COMPOUNDS
ALL-PURPOSE BUFFING COMPOUNDS
WHITE COLORING COMPOUNDS
EMERY CAKE
PLASTIC BUFFING COMPOUNDS
NICKLE BUFFING (LIME)
TALLOW GREASE STICK
POLISHING WHEEL CEMENT
PUMICE GREASE STICK

Meet "Big Joe" who just don't know. Joe has some rare accomplishments in life. He's a graduate in the art of wasting time and increasing production costs—He's NEVER HEARD OF SCHAFFNER PRODUCTS — He reaches for the wrong product. So-o lets suggest that "Big Joe" sends for Schaffner Free Samples — and he'll become "Smart Joe."

Schaffner

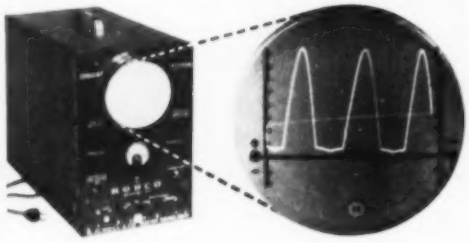
MANUFACTURING COMPANY, INC.

SCHAFFNER CENTER • ROSEWOOD 1-4903 • EMSWORTH PITTSBURGH 1, PA.

TWO NEW ROHCO PRODUCTS FOR BETTER PLATING

(As Demonstrated At The Industrial Finishing Exposition)

ROHCO CURRENT TESTER



The ROHCO Current Tester is to the production rectifier what the Hull Cell is to the plating bath. It enables you to detect and correct the hidden troubles of rectifiers that your meters don't show. These can cause poor plating just as readily as impurities do in your plating solution. Use the ROHCO Current Tester to check rectifiers weekly or oftener. Only two controls and two minutes are required to give you a television picture with the current tester clipped to the busbars. Years of practical experience have culminated in this new, essential aid to better plating.

HANGING HULL CELL

The Hanging Hull Cell is the new method for making plating tests of baths under production conditions. By simply suspending the Hanging Hull Cell on the cathode bus bar (just as you hang a rack of work), spot checks of baths are made with almost no time or effort. If this indicates anything wrong, the standard Hull Cell test is made of a small bath sample. Adaptable to any type of still or automatic plating, it is invaluable in following trouble through a sequence of operations. Oversize test plates and a 4½-inch ammeter face are used for easy and accurate interpretation of results.

R. O. HULL & COMPANY, INC.

1302 Parsons Court • Rocky River 16, Ohio

Canada: Armalite Company, Ltd., Toronto 6, Canada

OTHER ROHCO PRODUCTS: ROHCO 100 BARREL ZINC BRIGHTENER • ROHCO 303 STILL ZINC BRIGHTENER • ROHCO 20XL CADMIUM BRIGHTENER • RINS-AID • ROHCO IMPERIAL SILVER BRIGHTENER • NO-CRO-MIST® • HULL CELL TEST SETS AND RECTIFIER UNITS • ZINC PURIFIER • FORCITE ANODE BASKETS • ADDITION AGENT PUMP

ROHCO

JUST PIN THIS COUPON TO YOUR LETTERHEAD!

R. O. HULL & COMPANY, INC.
1302 Parsons Court
Rocky River 16, Ohio

Please send information on the ROHCO Current Tester and the Hanging Hull Cell.

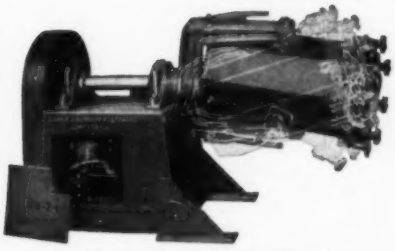
Name ..... Title .....
Company .....
Street Address .....
City ..... Zone ..... State .....

USE "RELIANCE" PRODUCTS FOR

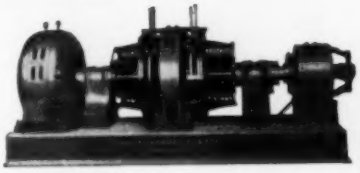
ECONOMY : EFFICIENCY : DEPENDABILITY

LET US SUPPLY YOUR NEEDS FOR YOUR PLATING OR POLISHING DEPARTMENT

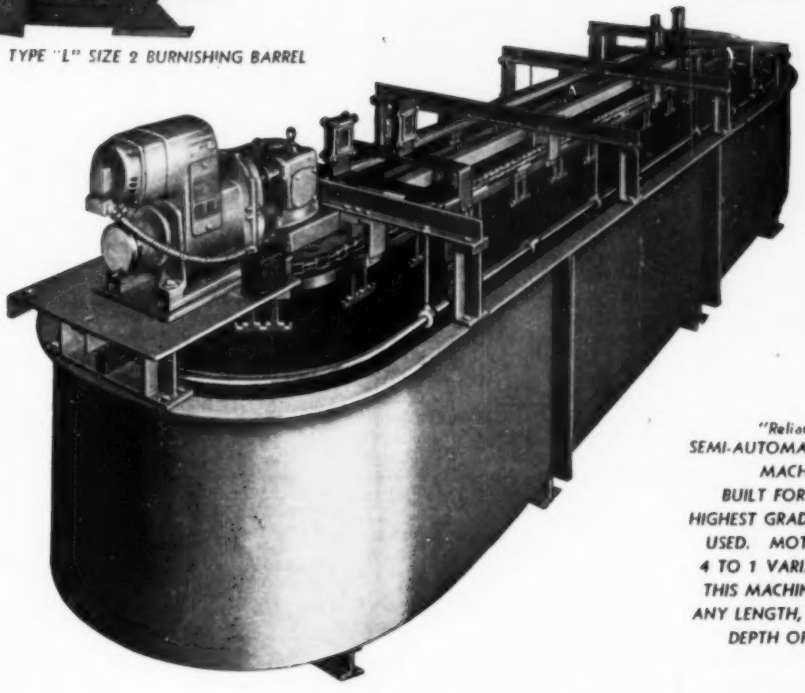
WRITE FOR FURTHER DETAILS



TYPE "L" SIZE 2 BURNISHING BARREL



3000 AMP. 6 VOLT GENERATOR SET



"Reliance"
SEMI-AUTOMATIC PLATING MACHINE
BUILT FOR SERVICE
HIGHEST GRADE MATERIAL USED. MOTOR ½ HP
4 TO 1 VARIABLE SPEED.
THIS MACHINE IS BUILT ANY LENGTH, WIDTH AND DEPTH OF TANK.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS of

Plating and Polishing Machinery

Complete Plating Plants Furnished

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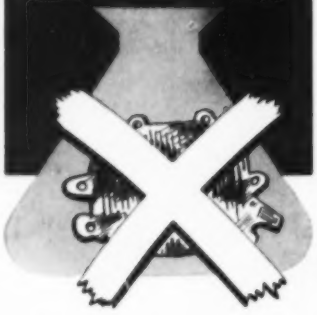
and
Los Angeles

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1226.

Remove Occluded Salts with DU-LITE "SD"



"Creeping salts", the residual reaction often following the black oxidizing of metals, can now be removed without special equipment with Du-Lite "SD". This new compound eliminates special rinses and extra handling which have previously been required. "SD" was developed specifically to remove trapped salts from the surface of porous, laminated, sintered, spot-welded, and similar parts.

Du-Lite "SD" can be used in an ordinary iron tank. It completely removes all salts with a visible "boiling" action, even in blind holes and the most irregular surfaces. "SD" requires no strength tests and only the normal dragout need be replaced.

In addition, "SD" liquid compound leaves a light protective coating which in many cases provides a satisfactory final finish.

Production proven "SD" liquid compound is available immediately. Descriptive bulletin is being mailed to all Du-Lite users; if you haven't received yours, write today to "The Finishing Specialists".

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONN.
Send more information on Du-Lite "SD"... ☐
Send information on metal finishing products.. ☐
Have your representative call..... ☐
Name
Company
Address
City Zone State

Du-Lite
METAL FINISHING SPECIALISTS

Equipment and Supplies

which permits its use for many purposes. Secondary port hole covers within the head offer no difficulty.

The old hazard of poisonous or irritating dust conditions due to agitating the contents of drums with noisy hammer and chisel method is eliminated. Full details may be had by using Reader Service Card.

E 957. Low Cost Chain Conveyor—From the United States Spring and Bumper Company, Los Angeles, comes the new, improved Chainveyor, latest development in light capacity, power-driven, overhead chain conveyors.

Engineered to provide dependable, trouble-free, long-time operation, Chainveyor costs much less than conventional type conveyors. It handles loads up to 30 pounds on each pendant spaced at six-inch intervals, or 60-pound loads at 12-inch intervals when supported by two pendants fitted with cross bar attachment.

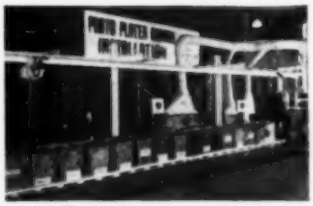
A varispeed drive provides instant adjustment of conveyor speeds of from three to nine feet per minute while the unit is in operation. Optional higher or lower speed ranges are available. For detailed information use Reader Service Card.

E 958. Rigid Plastic Pipe and Fittings—As a result of a three-year intensive research and development program, Atlas Mineral Products Company announces the commercial availability of its Ampcoflex rigid plastic line.

The new material is available as extruded pipe with molded fittings, formed containers and fabricated tanks, as well as square and round duct sections in standard sizes. Non-standard units can also be designed, engineered and fabricated at the Mertztown plant. Descriptive and technical information are available. Use Reader Service Card.

E 959. Waterproof Sandpaper—Behr-Manning Corporation, Division of Norton Company, announces the development of a new waterproof sandpaper for industrial

20,000 Experts Admire the Finish AND the Tanks!



Educational Exhibit shows advantages of

LUSTER-ON® and PLA-TANK®

All over the Industrial Finishing Exposition at Chicago, the two big words were LUSTER-ON and PLA-TANK. In the Electroplaters' Institute demonstration shown above a complete zinc barrel-plating line turned out these license plate nuts and bolts by the thousand — all brilliantly finished with long-lasting, corrosion-resisting LUSTER-ON dip.

LUSTER-ON is the original passivating bright dip introduced in 1944 by The Chemical Corporation. Since then it has been adopted by many of the leading industries of the country on such items as auto parts, aircraft parts, hardware items, wire goods, television components, electrical parts, tools, etc. Every day former users of nickel and cadmium are converting to this passivating bright dip.

Naturally the tanks, hoods and duct work were all PLA-TANK Resin-Bonded Fiberglas®, the amazing new reinforced plastic material which resists most plating solutions, acids, dips and rinses. PLA-TANK is the pioneer in this field, designed and built by metal finishing men for metal finishing use.

Send for free data sheets on Luster-On and Pla-Tank and set of license plate bolts shown.

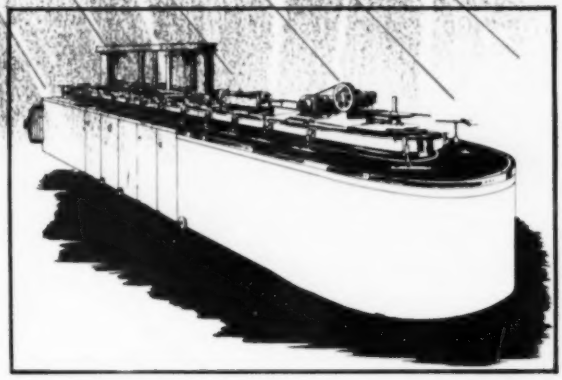
THE Chemical CORPORATION
37 Waltham Ave., Springfield 9, Mass.

LEA

Copper-Glo*

★ produces a brilliant, soft, copper plate requiring no buffing to produce high color; it comes from the tank with adequate brilliance.

★ if smoothness is a factor and if the base metal itself is not buffed or polished, simple buffing of the Lea Copper-Glo coating will produce an excellent smooth finish without diminishing its inherent brilliance.



WHETHER you are interested in brilliance only or in brilliance plus smoothness in the copper plating phase, you can save in production time (and in plating material) by using Lea Copper-Glo. You cut production costs by eliminating entirely or reducing substantially prior grinding operations on either cast, forged, or spun pieces.

You can also save in tank time, perhaps as much as 50%, and still produce a deposit that will have excellent buffability.

Lea Copper-Glo may be the answer to your problem of (1) producing a better copper plated surface and (2) reducing operating time. Why not investigate it NOW?

Investigate LEA CUPRALL for operations where ONLY BUFFABILITY rather than a combination of buffability and brightness is required. It's an all-purpose cyanide copper addition agent.

**Ronal Bright Copper Process, using Lea Copper-Glo, is a development of Ronal Chemicals, Long Island City, N. Y.*

Burring, Buffing, Polishing, Plating and Spray Coating . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learok . . . Industry's quality buffing compounds for over twenty-five years

THE LEA MANUFACTURING CO.

16 Cherry Avenue, Waterbury 20, Conn.

LEA MFG. COMPANY OF CANADA, LTD.

370 Victoria Street, Toronto 2, Canada

Available for Immediate Shipment, Attractive Values

THE FOLLOWING EXCELLENT REBUILT AND GUARANTEED ELECTROPLATING MOTOR GENERATOR SETS AND RECTIFIERS, WITH FULL CONTROL EQUIPMENT:

PLATERS

1—7500/3750 AMPERE, 6/12 VOLT, "OPTIMUS."
1—6000/3000 AMPERE, 6/12 VOLT, CHANDEYSSON.
1—6000/3000 AMPERE, 6/12 VOLT, BOGUE.
2—5000/2500 AMPERE, 9/18 VOLT, ELECTRIC PRODUCTS, 25° C.
1—5000/2500 AMPERE, 9/18 VOLT, CHANDEYSSON, 25° C.
1—5000/2500 AMPERE, 6/12 VOLT, EAGER.
1—3000/1500 AMPERE, 6/12 VOLT, HANSON-VAN WINKLE-MUNNING CO.
1—2500/1250 AMPERE, 6/12 VOLT, HANSON-VAN WINKLE-MUNNING CO.
1—2000/1000 AMPERE, 6/12 VOLT, "OPTIMUS."
1—1500/750 AMPERE, 6/12 VOLT, HANSON-VAN WINKLE-MUNNING CO.
1—1500/750 AMPERE, 6/12 VOLT, CHANDEYSSON.
1—1000/500 AMPERE, 6/12 VOLT, CHANDEYSSON.

ANODIZERS

2—1000 AMPERE, 30 VOLT, IDEAL, Exciter-in-head.
1—1000 AMPERE, 40 VOLT, CHANDEYSSON, 25° C.
1—500 AMPERE, 40 VOLT, M. G. C., Exciter-in-head.
1—400 AMPERE, 40 VOLT, M. G. C., Exciter-in-head.
1—500 AMPERE, 25 VOLT, CHANDEYSSON, 25° C.

RECTIFIERS

1—2000 AMPERE, 6 VOLT, G. E. COPPER OXIDE RECTIFIER.
1—GREEN SELECTROPLATER, 1800 AMPERE, 12 VOLT.
2—UDYLITE MALLORY, 1440/720 AMPERE, 6/12 VOLT.

BUFFING LATHES

3 HP, 5 HP, 7½ HP and 10 HP, DIVINE, HAMMOND, M. G. C., GARDNER, TWIN 5 HP & TWIN 7½ HP ROME, and other popular makes.

SPECIAL

2—CROWN 12 x 12 and 18 x 18 CENTRIFUGAL DRYERS, steam heat.
5—24" and 30" ROBBINS & MYERS 2-SPEED VENTILATING FANS.
2—DIVINE & PORTER CABLE BACK STAND IDLERS.
2—CROWN 5-COMPARTMENT AND 2-COMPARTMENT HORIZONTAL TUMBLING BARRELS.
1—No. 1 RONCI LACQUERING MACHINE.

Above is partial list only. Write to us for all your requirements for Plating, Anodizing and Metal Finishing.

Any of the above machines may be rented. Write for details.

M. E. BAKER CO.
95 WHEFLER STREET
Kirkland 7-5460 CAMBRIDGE 38, MASS.

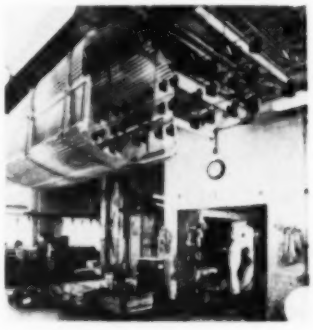
Equipment and Supplies

users—Tuflak Speed-wet Durite Paper.

A combination of toughness and new flexibility with increased durability, mileage, "hand", and resistance to skidding and peeling of grit are obtained whether the sheet is soaked in the usual liquids for a few minutes or for hours. For additional information use Reader Service Card.

E—960. Far-infrared Ovens—A new far-infrared oven at the Foxboro Company, Foxboro, Mass., bakes paint on 22,000 separate meter parts in an eight-hour shift. Consisting of only four aluminum Chromalox radiant heaters and reflective aluminum sheeting, the lightweight oven is conveniently located overhead to save valuable floor space.

No slow-up is necessary to accommodate light colors as usually would be the



case with ordinary infrared lamps. Since the radiant heat is directed and reflected into the work rather than convected around it, it has not been necessary to close the ends of the oven. For more information on these ovens write to the Edwin L. Wiegand Company, 7686 Thomas Blvd., Pittsburgh 8, Pa., or use Reader Service Card.

E—961. Heat Resisting Aluminum Paint—Sheffield "Super-Hot" is a new ready-mixed aluminum paint development of the Sheffield Bronze Paint Corporation of Cleveland, Ohio. When applied to practically any metal surface, it becomes permanently bonded to this surface upon subjecting this painted metal to heat of from 500 degrees to 1600 degrees Fahrenheit.

This paint adds a protective and decorative finish to furnaces, pipes, boilers, ovens and other metal surfaces withstanding 1600 degrees of heat. It maintains its brilliance and will not crack, chip or peel!

For further information on this inexpensive finish for plumbing fixtures, toys, automobile accessories and dozens of other applications, use Reader Service Card.

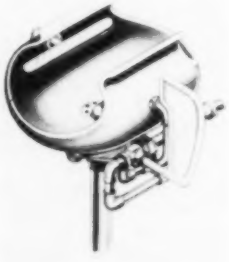
E—962. Low-cost Mask and Shield—A featherweight Lumarith plastic mask and replaceable cotton gauze filter, effective for numerous light dusts and chipping hazards, is announced by General

Scientific Equipment Company, Philadelphia, Pa. For complete information use Reader Service Card.

E—963. Zinc Die Castings Reverse Current Conditioner—Oakite Products, Inc., New York, have announced the availability of Oakite No. 95, a composition designed primarily as an electrolytic conditioner for zinc base die castings in preparation for plating.

The new material offers the following advantages: fewer rejects—brighter plating and no blackening during anodic cleaning. Additional information is available. Use Reader Service Card.

E—964. High Efficiency Eye Wash Fountain—Demand for an eye-wash fountain that would instantly wet all parts of the face but without danger of



recontamination has been met by the Logan eye, nose and mouth wash fountain.

The unit makes available now for the first time an eye-wash fountain that fully meets all known industrial hygiene recontamination regulations and plumbing and sanitary standards. Manufactured by Logan Emergency Showers, Inc., Box 111, Glendale, Calif., it comes in pedestal or

guess work won't go on...

CYANIDE WASTE TREATMENT

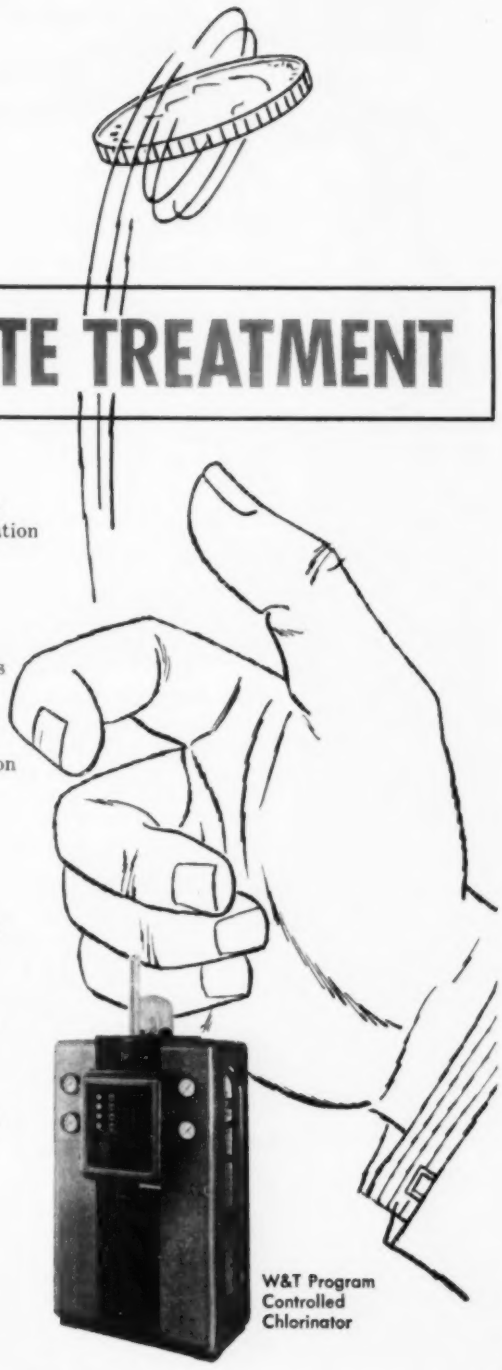
Experience, not guess work, is the basis for the success of Wallace & Tiernan's alkaline chlorination installations for cyanide waste treatment.

CHLORINATION KNOW-HOW

Alkaline chlorination — now accepted as standard cyanide waste treatment practice in the metal finishing industry — oxidizes cyanides by chlorination at controlled pH values. It is effective and economical when properly applied. Since no two cyanide waste problems are the same, the method of applying alkaline chlorination varies. Based on its experience in over 100 such installations, Wallace & Tiernan is prepared to suggest the proper equipment to suit your particular plant.

W&T AUTOMATIC CONTROL

The precision chlorinators for which Wallace & Tiernan has been known for thirty-nine years have been combined with newly developed instruments to make possible the automatic control of alkaline chlorination treatment — an assurance that cyanides are destroyed — and at minimum chemical costs.
Eliminate guess work on your cyanide waste disposal — write today for further information.



W&T Program Controlled Chlorinator

WALLACE & TIERNAN
COMPANY, INC.
CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

S-77

IT'S THE FINISH THAT COUNTS

Roto-Finish COMPOUNDS AND CHIPS ARE MADE TO GIVE YOU THE PROPER FINISH ECONOMICALLY

There are other brands of materials that resemble Roto-Finish chips and compounds . . . but only Roto-Finish chips and compounds give you the *extra advantage* of continuous research by the company who originated the Roto-Finish processes. Roto-Finish chips and compounds are carefully manufactured so *you* obtain the best results on *your specific job*. To obtain the best results at the lowest cost . . . insist on ROTO-FINISH chips and compounds.

ROTO-FINISH puts your grinding, deburring descaling, polishing, brushoning or coloring operations ON A MASS PRODUCTION BASIS

SAVES MAN HOURS AND MONEY by eliminating hand finishing.
GIVES ABSOLUTE UNIFORMITY...in any quantity.
MAINTAINS PRECISION TOLERANCES.
CUTS FINISHING costs as much as 80%.
LOWERS INITIAL and MAINTENANCE costs.

ROTO-FINISH COST-FREE ENGINEERING SERVICE GUARANTEES RESULTS

Put the experience and facilities of Roto-Finish to work for you on *your special finishing problems.*

Send a few unfinished parts to us . . . plus a finished part as a guide. We *guarantee* that you will get the same results in your plant that we produce in our laboratory. There's no obligation.

Write for fact-packed Roto-Finish catalog for complete information.

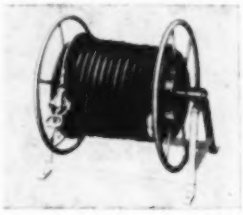
Roto-Finish COMPANY
associated with The Sturgis Products Co.
3703 MILHAM ROAD, KALAMAZOO, MICH.
P. O. Box 988—Phone 3-3378

FOREIGN REPRESENTATIVES: CANADA — Windsor — Roto-Finish Canada Limited • ENGLAND — London — Roto-Finish Limited — 39 Park Street — Mayfair • AUSTRALIA — Melbourne — A. Flavell Pty. Ltd. • HOLLAND — Delft — N. V. Roto-Finish Maatschappij — Rotterdamse — WEG 370A • AUSTRIA, GERMANY, SWITZERLAND — Frankfort a.M. — Metallgesellschaft A.G., Germany • ITALY — Milan — Societa Roto-Finish a R.L. — Sesto S. Giovanni — Viale E. Marelli 31 • FRANCE — Paris — Societe Roto-Finish, 70 rue de la Republique-Puteaux (Seine) • BRAZIL — Rio de Janeiro — Commercial E. Industrial de Formas Worco, Ltda.

Equipment and Supplies

wall mounted types. For further information use Reader Service Card.

E—965. Continuous Flow Quick-Acting One Man Hose Reel—A new, continuous flow hose reel for fighting fires instantly and keeping water damage to a minimum has recently been developed by



Wirt & Knox Manufacturing Company, Sedgley Ave., York and 23rd Sts., Philadelphia 32, Pa. A swivel joint connection in the pipe line allows full water pressure at the hose nozzle even when the hose is coiled on the reel and permits application of a full stream of water on the fire while the hose is being unreeled.

The rounded surfaces of the reel prevent cutting or other damage to the hose while a universal mounting permits easy installation on walls, columns, ceilings or floors. For additional data, use Reader Service Card.

E—966. Altitude Test Chamber—Tenney Engineering, Inc., Newark 5, N. J., manufacturers of environmental test chambers and "lowside" refrigeration equipment, announce a standard line of altitude chambers designed to cover the

majority of all altitude test requirements. This makes possible the selection of altitude chambers from existing specifications, avoids the extra cost of custom built units. • Known as the TenneyZphere, the chambers provide vacuum conditions simulating altitudes from sea level to approximately 80,000 ft, temperatures from 200° F to −100° F, and relative humidities from 20 to 95 per cent. For further information on these altitude chambers use Reader Service Card.

FOR PLATING STEEL

2 Unique Cleaners Improve Results SAVE MONEY!

Diversey No. 909 and No. 12 are two outstanding cleaners specially developed to provide superior finishes on steel surfaces through better, more thorough cleaning performance.

No. 909 and No. 12 are easily applied to a variety of different cleaning routines. No. 909 is a unique heavy duty soak tank cleaner. No. 12 is an electrocleaner for both direct and reverse current. The following case history is typical of the results you can expect through the application of Diversey No. 909 and No. 12.

Case History

Tubular Steel Furniture

PROBLEM: To clean polished steel tubular furniture prior to bright nickel and chromium electroplating.

FORMER PROCESS: Included mineral spirits soak, hand-wipe spray wash, alkaline soak and two electrocleaning operations in which six men, working steadily, were employed in the hand wiping operation.

PRESENT PROCESS: Diversey No. 909 was substituted for mineral spirits and alkaline soaks and the hand wiping. Diversey No. 12 was used in the electrocleaners.

RESULTS: With Diversey No. 909 there is less smut and grease on the inside of the tubes than with former process thus avoiding contamination of pickle and plating tanks. The cleaner tanks now are dumped every two weeks rather than every week as was formerly necessary. The No. 909 and No. 12 are the only materials this leading finishing plant has found that would eliminate the solvent and hand-wipe operations. The elimination of the hand wiping labor costs results in an estimated savings of $15,000.00 per year. A definite increase in smoothness and luster of the electrodeposit has been obtained with Diversey No. 909.

COMPLETE INFORMATION AVAILABLE *For additional information, including technical bulletins, mail the handy coupon or call your Diversey D-Man. He will be pleased to work with you. Mail the coupon or call today.*

MAIL THIS COUPON FOR MORE INFORMATION

THE DIVERSEY CORPORATION
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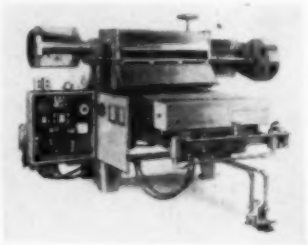
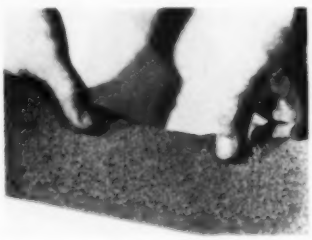
E–957. Surface Finishing Machine for Non-Magnetic, Decorative Name Plates—Clair Manufacturing Company, Olean, N. Y., has introduced a Model 203-A machine, developed specifically for surface finishing formed decorative name plates for refrigerators, stoves, appliances and automobile trim.



Through a vacuum chuck arrangement, the unit will handle name plates made of brass, copper, silver, plastic, aluminum, wood and other non-magnetic materials. Even small items can be held and surface finished without interference with coverage over the entire surface. Additional details on the surface finishing machine may be obtained by using Reader Service Card.

E–968. Cork-Surface Polishing Belt—A new granulated cork coated abrasive polishing belt for obtaining a very high lustre on glass, ceramics, metal and plastic has been announced by Minnesota Mining and Manufacturing Company, 900 Fauquier St., St. Paul, Minn.



The new "wet or dry" belt is designed to replace the conventional buffing wheels and cork set-up wheels, eliminating set-up time and resulting in faster polishing, higher finishes, and lower unit cost. It is available in a single universal surface in all standard sizes for existing abrasive belt grinding and polishing equipment. For additional data use Reader Service Card.

E–969. Du-Lite "SD"—A new compound which completely removes occluded

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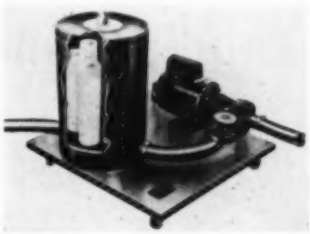
salts with one rinse after the black oxidizing of metals has been developed by the Du-Lite Chemical Corporation, Middletown, Conn.

This liquid compound Du-Lite "SD" reacts with black oxide salts and when used at 225° to 275° F, a visible boiling results until all salts are removed. Exhaustive humidity testing of parts treated with the compound, which can be reused produced no trace of occluded salts nor of rust, which the light coating left by the compound also prevents. For further information use Reader Service Card.

E—970. Piston Operated Steam Trap—Velan Engineering Company, Jersey City, N. J., announce a new integrally designed Velan Steam Trap for applications where exceptionally large capacities are required. This new trap being comparatively small and 3 to 10 times lighter than other designs of similar piston-operated traps has a 2-inch orifice with tremendous capacities. All moving parts are made from stainless steel. The trap can be supplied with screwed connections $1\frac{1}{2}$ inch, 2 inch, $2\frac{1}{2}$ inch, 3 inch or with flanged connections $1\frac{1}{2}$ inch to 5 inches. For more information use Reader Service Card.

E—971. Sethco Filter Pumps—ASI Series—Sethco announces its most recent addition to its line of filtering equipment. Models ASI-400 and ASI-600 are designed and constructed to produce sparkling filtration of practically any acid or alkaline solution from *p*H 1 to *p*H 14. The units are extremely simple and economical to operate and are budget priced.

The pump and all fittings are of stainless steel type 316. Material of construction of the filter assembly is a recently developed synthetic resin, "Sethrin,"



which has extreme chemical inertness and excellent temperature resistance. For additional information use Reader Service Card.

E—972. Bright Gold Process—Sel-Rex Precious Metals, Inc., of Belleville, N. J., has recently introduced a new bright gold process that produces mirror-bright, exceptionally hard gold deposits from

"flash" gold plating to extremely heavy gold deposition (0.000001 to 0.005 inch thickness). Simple formulation and easy maintenance feature the process that is operated at room temperature. For complete details and technical specifications use Reader Service Card.

E—973. Interim Rust Prevention, Combined with Barrel Deburring—The Magnus Chemical Company, Garwood, N. J., announces a novel use of its temporary rust preventing material, Magnus 26N.

Recently a maker of steel washers tried it in one of their deburring barrels, with the idea that the material would provide adequate assistance in deburring, and at the same time, supply good rust preventive effect to the deburred work. Washers are thoroughly deburred after which they are removed and left to dry just as they are, without stickiness and then are packed and shipped in a completely clean, non-rusty condition. Data for use in other similar applications is available. Use of Reader Service Card.

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News about

COATINGS for METALS

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By compensating for nickel with other materials

Chromium Plating Still Gives a Lasting Finish

Tin-lead anodes better for chromium plating

Experience shows that tin-lead alloy assures long service in chromium plating solutions. It provides better resistance to chromic-acid attack over a wide range of operating conditions. Unichrome Anodes not only use solid tin-lead alloy throughout, but also have fused-on copper hooks designed for maximum conductivity; and a body with ample area and thickness for good current distribution and cooler operation.

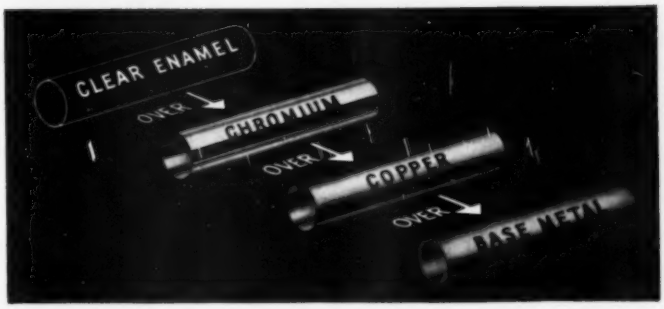
COPPER PLATING PROCESS IMPROVED

The wide current density range at which the Unichrome Pyrophosphate Copper Process plates smooth and fast is maintained over long periods of continuous operation by an improvement in its makeup.

In addition, this process continues to solve other plating plant problems. It can be used in plastic lined tanks formerly used for nickel. It can be plated directly with chromium, with only simple buffing or chemical polishing if needed. It contains no cyanide to dispose of.

ZINC FINISH STAYS BRIGHT AS CHROMIUM

Zinc plate, when chemically treated in Unichrome Clear Dip and then fortified with a Unichrome Clear Enamel, provides a substitute finish which can satisfy exacting requirements. The Clear Dip forms a bright-as-chromium finish integral with the zinc, while the clear enamel adds extra wear and corrosion resistance to this protective finish without detracting from its brightness. This successful finishing system is in widespread use today on zinc die cast and steel products.



Despite scarcities, many products still offer the powerful appeal of a good quality chromium finish. One method for producing such a finish offers substantial advantages. Corrosion resistance is achieved with alternate materials – copper for the undercoat, organic coating for a topcoat. As for the chromium itself, better, faster plating is being obtained with the Unichrome S.R.H.S. Chromium Bath.

PRODUCTION ADVANTAGES WHEREVER USED

Many plants are plating to specifications with Unichrome S.R.H.S. Chromium 20 to 80% faster than with the ordinary chromium bath – and with less trouble. Self-regulating, it minimizes control and maintains top throwing power. With wider bright plate range, it avoids rejects due to "burning" or "missing." Recent reports give some idea of the great improvements this bath has worked on production, costs, and results:

Fishing line guides are plated in 2/3 the time by S.R.H.S. Chromium, and with better coverage and brighter plate. By using this bath, another plant doubled capacity for plating various parts including zinc die castings – and eliminated the former need for special racking. Companies report savings in bath maintenance, too.

A GOOD COPPER UNDERCOAT

Copper plating on zinc die castings and steel contributes to corrosion resistance, and to a brighter finish. Copper deposited from the Unichrome Pyrophosphate bath makes an excellent base for the chromium. If base metal condition and quality requirements permit, it needs no buffing or chemical polishing. If not, it can be easily polished either way.

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Unichrome Clear Coatings were developed especially for use on plated and polished metals. They add extra protection without detracting from brightness.

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Unichrome Coating B-159 also gives outstanding service. A well known manufacturer for instance, is using it on chromium plated refrigerator shelves and is getting not only superior protection but also twice the film thickness at half the cost of the coating formerly used.

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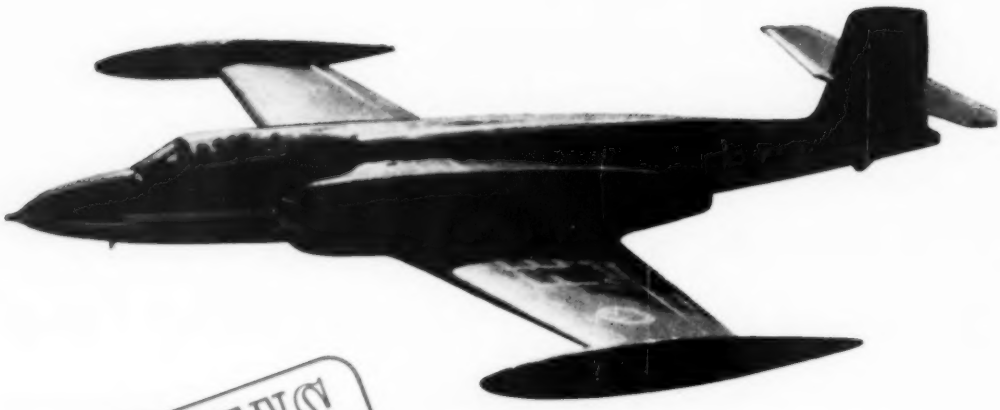

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OCTOBER, 1952 VOL. 39, NO. 10

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Editorial

"E" Day

ACCORDING TO STATISTICS, only approximately 51 per cent of those eligible to vote exercised their constitutional right of suffrage in the 1948 Presidential election. This record, when compared with that of the 1900 election when about 73 per cent of the eligibles voted, is undeniably disturbing. A glance at the voting records in recent English and Canadian balloting shows, respectively, an 83 per cent and 75 per cent participation by the citizens of those countries.

To be sure, there are some thousands in the United States who are prevented from voting by the peculiarities of the numerous local, county and state voting district eligibility requirements. The poll tax is a well-known restrictive measure, and there are others that are not as well publicized. Similarly, there are those, away on business, some of it motivated by reasons of highest patriotism, who are not able to vote on election day.

These conditions affect only a part of the electorate. The others who abstain, numbering in the millions, are those whose motives are perplexing. It is difficult to believe that almost half of the adult population of a nation, with about the lowest percentage of illiteracy, was so disinterested in the running of its government that it failed to express an opinion for or against the parties in power at the various governmental levels. The creeping paralysis of voter apathy expressed by the persistently downward plunge of the number voting in the past several elections is alarming. Inasmuch as good government stems only from an alert, active and discriminating citizenry, continued ballot inactivity can be disastrous.

However, signs of an alerted populace are evident in the numerous registration and get-out-the-vote drives being made. While these efforts should be intensified and maintained constantly through "E" Day, it is only through the fulfillment of our privileged duty that such labors will be rewarded. A substantially increased total vote on November 4 will be gratifying. The important thing to do on that date is to vote, and as an extra measure of great citizenship, see that your neighbor does, too! Whether he votes for the nominees of the party of Lincoln or those of the party of Jefferson, and quite probably in disagreement with your own choices, is not as significant as the fact that you both vote.

Al Korbelak

INCREASING COPPER CONTENT IN WHITE BRASS AND COPPER CYANIDE SOLUTIONS BY ELECTROLYTIC REGENERATION

WALTER B. BINAI*

WITH THE VANISHING of nickel and nickel chemicals from the civilian goods electroplating market, decorative plating consequently is being more and more replaced with chromium on bright copper as well as chromium on bright white brass. Both white brass, as well as cyanide copper solutions, require frequent additions of copper cyanide in order to maintain the copper concentration. Due to the scarcity of copper cyanide, copper concentrate made its appearance and became quite a popular substitute and indeed a life saver. The object of this paper is to illustrate a new method of introducing copper to the plating solution without the addition of copper cyanide or copper cyanide concentrate. It is accomplished by an electrolytic regeneration cell which will be described in detail later in this paper.

White Brass Plating

White brass is an alloy of zinc and copper plated from a cyanide solution containing zinc cyanide and copper cyanide and addition agents, and has a deposit composition of approximately 82 per cent zinc and 18 per cent copper. The white brass electrolyte is quite similar in composition to that of a cyanide zinc solution with the exception of the added copper cyanide and addition agents. One of the features of such a plated alloy, unlike that of bright zinc, is that it can be plated directly with chromium to produce a finish comparable to that of chromium over bright nickel.

In a white brass solution where only zinc anodes are employed, it becomes necessary to make additions of copper cyanide during the plating operation in order to maintain the alloy composition. Another difficulty experienced is that fluffy and spongey copper is cemented out on the zinc anodes which not only causes roughness but reduces the copper content in the plating solution.

Cyanide Copper Plating

Most proprietary bright copper solutions operate with a cathode efficiency near 100 per cent in order to produce a bright plate. Normally the anode efficiency of such a solution is also 100 per cent. When operating under such ideal conditions, the rate of metal going into the solution will be equal to that of metal plating out and the decrease in metal in the solution will be due to dragout only. Copper in a cyanide plating solution exists in a monovalent state. The rate of deposition or the rate of solution, however, is governed by the state of valency of the copper ions at the anode as well as the cathode film. Quite frequently the copper anodes become polarized, either due to insufficient area or too tight bagging or poor circulation of the solution. Under such conditions a copper hydroxide anode film is formed. When the anode thus becomes polarized with a bi-valent film, its efficiency is reduced well below that of the cathode. The copper concentration is rapidly decreased and the free cyanide increased along with an increase of carbonates due to cyanogen decomposition. A sharp rise in carbonate content is a good indication of anode polarization and a warning of potential solution decomposition.

Decomposition Products

When the rate of metal going into the solution lags behind that of metal plating out, then the free cyanide content will increase with the liberation of free cyanogen. With the presence of free alkali the cyanogen serves to form cyanides as well as cyanates. However, after the free alkali becomes depleted the cyanogen will gradually polymerize into compounds that are highly unstable with an ultimate liberation of ammonia and carbon dioxide. These unstable organic compounds have a bad influence upon the addition agents in the solution, and impair brightness and throwing power. Such organic contamination derived from cyanogen decomposition will foul the solution beyond use in a short time.

Electrolytic Regeneration Cell

The use of insoluble anodes in cyanide solutions is a commonly accepted practice to prevent metal build up in solutions where the cathode efficiency is low. Where insoluble anodes are used altogether, provisions must be made to introduce metal ions to the solution, not intermittently but constantly, at the same rate that metal is plating out. The copper content of white brass or cyanide copper baths can be maintained by the use of an electrolytic regeneration system. The electrolytic concentration cell is an apparatus which will introduce copper ions to the electrolyte at a rate that can be controlled to fit individual requirements.

*Chemical Engineer, Indianapolis, Ind.

The use of diaphragm cells for producing metal in a plating solution is not at all new. For many years diaphragm cells have been employed in making gold and silver solutions. Ceramic pots such as alundum and aluminum silicate vessels have been used, but are fragile, have poor porosity and hence, poor conductivity, and tend to result in the build up of nuggets which when broken off damage the cell. The silicate containers may foul the solution with objectionable silica which not only causes roughness of deposit but tends to polarize the steel anodes. An ideal diaphragm is one which has the following properties:

(a) Must have a high porosity per unit area
(b) The porosity must be of such a nature as not to permit metal ions to pass through.
(c) Must wet readily, i.e., have a high capillary attraction.
(d) Must be mechanically strong.
(e) Must be impervious to the chemical action of the electrolyte.
(f) Must have a high electrical conductivity per unit area.
(g) Must have the least voltage drop. Preferably below 3 volts when operating at approximately 75 amperes per square foot of cell area.

The writer has developed a cell which is more suitable and more economical for production use than the ceramic pots. Fig. 1 shows an actual photograph of a production cell. This cell is rigidly constructed of rubber coated steel and is an oblong box, with approximate dimensions of 30 inches x 30 inches x 4 inches wide. It is provided with four windows on each side. Each window has an approximate opening of 100 square inches and these windows are so constructed that they will receive diaphragm panels and make a perfect water seal. Cypress was found to be a very satisfactory diaphragm medium. A cypress panel 100 square inches and 1/8 inch in thickness after being properly deresinized will conduct approximately 75 amperes. One cell has an ampere capacity of approximately 500–600 amperes.

Deresinized Wood Diaphragm

The wood panels are soaked in a solution of 10–15 per cent potassium hydroxide solution at room temperature for a period of 2–3 days. During this operation the panels are weighed down to prevent curling and warping. After this period the solution is drained out and fresh water is allowed to circulate until it is clear of brown resins. The panels are stored under water until ready for use.

Effect of Temperature on Wood Panels

For silver solutions as well as white brass where the operating temperature is not in excess of 110° F, cypress has a reasonably long life. In cyanide copper where the solution temperature reaches as high as 180° F, cypress will deteriorate in a short time. In a copper solution, however, where the required rate of

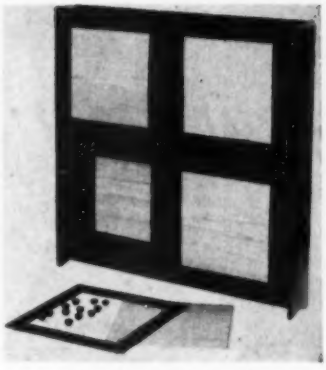

Fig. 1 Production cell

copper addition is very small, the regenerating tank required will also be quite small, perhaps less than 10 per cent of its total volume. It would be well to provide means of cooling the electrolyte in the regenerating tank. The solution temperature in the regenerating tank should not exceed 120° F.

Intermittent Regeneration of Metal in a Cyanide Copper Solution

After the cell has been properly fitted with deresinized wood panels, an electrolyte of 2 oz/gal potassium hydroxide and 2 oz/gal potassium cyanide is placed in the cell. It is important at this point to examine the cell to be sure that no solution leaks out. It must be/solution tight. The cell is then placed on the cathode rod of the plating tank. The wood diaphragm serves as a screen, when the current is turned on. Although metal is going into solution at the anode, metal will not pass through the wood panel and consequently remains in the plating solution. Hydrogen gas is evolved at the steel cathode within the cell. In order to raise the metal content to a given value, it would be necessary to calculate the total metal required in terms of Faradays. 1,000 ampere hours will electrochemically produce 7.37 lbs. of copper cyanide. Since the cell has an ampere capacity of 500 amperes, each cell will impart to the solution 3.68 lbs. of copper cyanide per hour or approximately 30 lbs of copper cyanide per eight-hour day. Assume that it is required to add 28 lbs of copper cyanide to a white brass solution during the shut-down period of four P. M. and seven A. M. the next morning; 28 lbs of copper cyanide represents 3800 ampere hours. Dividing 15 hours into 3800 ampere hours yields a figure of 254 amperes which is the required amount for the 28 lbs. needed. A single regeneration cell will be sufficient in capacity to do this.

Continuous Regeneration of Copper Cyanide

Either in a cyanide copper solution or in a white

(Continued on page 1131)

Your Dentist's A Plater, Too*

WALTER J. KRUMBECK†

Introduction

How many times have you left your plating plant and gone to see your friendly dentist? Perhaps you thought that you were getting away from plating. However, you might be surprised to learn that dentists are platers, too. Current density, throwing power, anodes, etc., are familiar terms to them since they utilize all the advantages of electroforming to provide certain necessary dental restorations.

Pre-Plating Technique

Crowns (the dental term used to denote the artificial replacement of the portion of the tooth projecting out beyond the gum) and inlay techniques require great accuracy. Electroforming provides the desired accuracy, and as with all plating operations, the correct pre-plating technique pays dividends in the production of quality finished items.

The initial operation in the formation of a gold crown is in the preparation of the tooth. Reshaping and alteration of the tooth structure is performed so that all of its surfaces are very nearly parallel but tapering very slightly toward the biting surface of the tooth. The tooth is also shortened about one-sixteenth of an inch to allow for the thickness of gold over the biting surface. There can be no undercuts in the preparation since the crown must slip on the tooth much as a thimble would slip on the finger of a seamstress. After the shaping preparations are completed an impression is taken. First a copper band that will just fit over the prepared tooth is trimmed so that it is a quarter of an inch longer than the tooth at one end and contoured to the shape of the gum at the other end. Impression compound, warmed and softened is then inserted in the copper band. The banded impression compound is placed on the tooth and gently pressed downward until the prepared tooth is covered. The band is held in place until the compound in contact with the tooth cools and hardens thus forming an indentation in the impression compound which is an exact negative replica of the prepared tooth, just as a footprint in wet concrete is a negative replica of the foot.

To make a positive replica the use of poured plaster or a similar material in the impression is suggested. However, the resulting replica or model would lack accuracy and would not have the hard non-porous surface so desirable in such a model. To overcome these shortcomings an electroformed copper model is made from the impression of the tooth. This requires the sensitization of the impression surface of the compound with a suitable electrical conductor.

One method consists of dusting a very finely divided copper powder into the impression and blowing off the excess thereby leaving a film of copper dust. A second consists of painting a thin film of colloidal graphite in the impression. Another method involves the chemical application of silver to the impression surface. The recent development of (Silbrite)‡ a material that forms a highly conductive silver film which may be applied with a brush is replacing other materials for surface treatment of impression compound. Through the use of this material a more nearly equal conductive cathode surface is obtained, resulting in a more even deposit of copper. The sensitizing step is carried out so that the conductive surface contacts the copper band to which a short piece of copper wire is connected as the cathode contact. Then the exposed surface of the band and the copper wire are given a coating of soft wax or stop-off lacquer as insulation, to restrict the deposition of copper to the conductive surface of the impression.

Plating Procedure

A neat compact dental electroforming apparatus is commercially available. Such a unit with its built-in rectifier operates directly from a 110-volt a-c line and is capable of electroforming several models at one time. Although this is a desirable unit, the need for an electroforming apparatus usually begins in dental school or early in practice when the commercial unit is prohibitively expensive. To meet the need and stay with-

*The opinions or assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

†Lieutenant, Dental Corps, U. S. Navy.

‡Distributed by Metals Disintegrating Corporation, New Brunswick, N. J.

in a limited budget, many dentists assemble their own unit from inexpensive materials (See Fig. 1). A popular method consists of connecting two large dry cells, a rheostat and a milliammeter in series. A long glass ice box dish serves as the plating tank with a strip of copper used as the anode at one end of the tank. The end of the copper is bent over the top of the tank and connected into the circuit with a battery clip. A plastic strip is notched to fit the sides of the tank and two holes are drilled in this strip so that the back ends of the two alligator clips will fit snugly in the holes. These clips serve as cathode holders and are cemented or sealed in place in the plastic. A standard acid copper sulfate solution is used with about 8 drops of liquid glue per gallon as an addition agent.

When the preliminary steps have been completed a glass medicine dropper is used to flush out the impression with a debubblizer to make sure that there are no air bubbles. The sensitized banded impression compound is then plated at a current density of approximately 15 milliamperes for each square centimeter of surface being electroformed (14 amp/ft^2) for about six hours. However, sometimes at the end of a busy day it may be forgotten and is plated all night. Since building up the crown takes place toward the inside, no harm is done to the crown; it forms a thicker shell, and weaker batteries. To effect a more uniform deposit of copper, slight agitation is employed along with an addition agent such as glue. Proper bath maintenance is carefully observed. All standard electroforming procedures for obtaining a hard and a smooth deposit are generally followed.

After the electroforming process has been completed a core of hydrocal (a substance similar to but much harder than plaster) is poured into the electroformed copper shell. When the core has set, the band is dipped into hot water to soften the impression material and thus facilitate removal of the band and impression material. The remaining electroformed copper shell with its hydrocal core is an exact duplicate of the tooth. Hot wax is then built up on the model of the tooth to form a crown of wax and is then used to make a gold casting by the lost wax process. The resulting gold casting is then put back on the copper model to check the fit. If all went well it fits and is then finished and polished on the copper model. The making of the copper model is the same for a gold crown, a gold inlay, a porcelain jacket crown or a plastic jacket crown. Fitting of the crown to the patient's tooth at a return appointment is the culmination of the process which involved the plating steps detailed above. At that time the crown is cemented through the use of a special dental adhesive. Since crowns and inlays rely upon frictional fit for their retention, the better the fit and the more nearly parallel the prepared surfaces of the teeth are, the greater the retention. However, they must have a slight taper to permit their seating and removal. The material used for cementing of crowns and inlays is

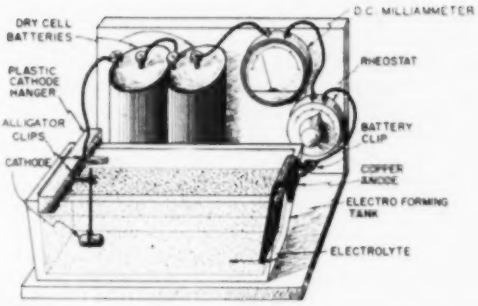

Fig. 1. Home-made copper electroforming unit

non-cohesive when it sets. It merely fills in the microscopic gap between the material and the tooth. The cement is slightly soluble in saliva. Therefore, the more accurate the fit of the crown or inlay, the thinner the layer of cement between it and the tooth. The thinner the cement layer the less surface area to be attacked by saliva and associated mouth bacteria and the longer the life of the cement and thus the tooth and crown or inlay

It becomes apparent that an accurate fit of the crown or inlay is essential for permanency. Without an accurate model an accurate fit is impossible. By using the electroforming process it is possible to have a model more accurate than that produced by any other technique known today.

Electro-Sterilization

Electrolysis is another electro-chemical technique used in the dental office. Electrolysis is used to sterilize the inside of teeth in root canal therapy (endo-

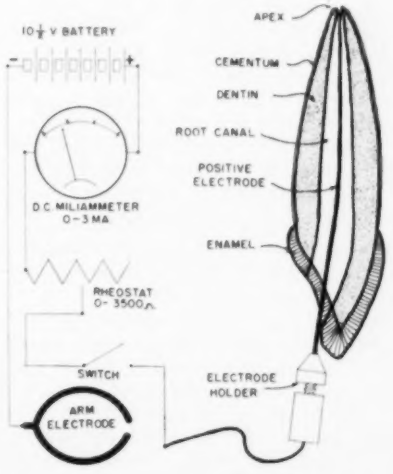

Fig. 2. Electrolyzer with electrode in root canal of tooth

dontia). To better understand endodontia and thus the need for the electrolysis technique a glimpse at the anatomy of a tooth is necessary (See Fig. 2). The part of the tooth projecting through the gum is the crown. It is covered with enamel, a pearly substance harder than steel. Below the gum is the root which is about two-thirds the length of the tooth. The root is covered by cementum, an intermediate substance between the tooth and surrounding tissue. Inside the enamel and cementum is the dentin, a substance somewhat similar in general appearance to hard dense bone. Starting at the root end of the tooth or apex and running down the center into the crown is a canal which is called the root canal. The root canal contains the pulp, a collective term for the soft connective tissue, the blood vessels, and the nerves. The opening of the canal at the apex of the tooth while not completely formed in a child may be a sixteenth of an inch in diameter. However, in an adult the diameter would be measured in hundredths of an inch.

Dental caries or decay travels through a defect in the enamel to the dentin. When caries gets to the dentin it progresses rapidly in all directions. If the tooth is not cared for, the infection reaches the pulp, and causes a swelling. Since the pulp is confined the process strangles the blood vessels at the narrow apex of the tooth. The pulp, thus devoid of a blood supply cannot get oxygen and nutrition and therefore dies. If the condition is still not cared for the infection travels the length of the tooth and out into the bone at the apex of the tooth. Another cause of death to the pulp is a sharp blow to the tooth. When this injury occurs the apex moves laterally against the bone and the narrow filament of the pulp is sheared off and dies from lack of nutrition and oxygen.

A patient with a dead pulp either must have the tooth extracted to prevent further spread of the infection or the tooth must receive root canal therapy. When the dentist decides that root canal therapy is the best treatment the tooth will be retained and treatment begun. First an opening is made in the back of the crown that projects down into the root canal. The remaining pulp is removed with barbed broaches. The canal is then cleaned and enlarged with tiny round tapering files in conjunction with sulfuric acid. The length of the tooth is determined through algebraic interpretation of X-ray pictures.

The most difficult part, that of sterilizing the tooth is done by electrolysis. Electrolysis for sterilization of root canals is not a new technique since it was first used in 1893. A commercial instrument for electrosterilization that operates from 110 volts may be purchased. However, both the cost of the unit and possibility of electrocution of the patient make an easily constructed battery unit more desirable in the opinion of many dentists. The electrosterilizer consists of: a 10½ volt battery, a switch, a 0–3 milliampere direct current meter, a 0–3500 ohm rheostat, a negative arm electrode, and a positive platinum-iridium tooth electrode. The components are all connected in series. The electrolyte consists of Appelton's iodine solution composed of: 15.0 grams zinc iodide, 0.6 grams iodine and 50 cubic centimeters distilled water. When the root canal has been dried the electrolyte is pumped to the apex with a file. The platinum-iridium wire electrode is inserted until it reaches to the apex of the tooth. A gauze napkin moistened in saline solution is placed on the arm and the arm electrode is fastened securely in place, making a good electrical contact with the body. The current is turned on and increased until a slight tingling sensation is felt around the tooth. The current is then reduced until no sensation is felt. Then a reading is taken on the milliammeter. The formula first determined by Ziegler in 1900 is used to determine the sterilization time. Ziegler's formula is:

$$\frac{30}{\text{tolerated milliamperes}} = \text{time of sterilization}$$

in minutes. Assuming the patient tolerates 1.5 milliamperes, the sterilization time will be 20 minutes. The patient usually tolerates between 1.0 and 2.0 milliamperes. Since bacteria have a negative charge they migrate away from the microscopic crevices and pits of the tooth and travel toward the positive platinum-iridium electrode. The electrolyte also undergoing electrolysis forms nascent iodine and iodates. The nascent iodine released at the positive electrode kills the bacteria which migrate toward it. The iodates kill the bacteria which cannot break away from the inside and apex of the canal. When the canal is sterile the entire length of the root canal is filled.

Conclusion

The dental profession has been using electro-chemical techniques for over half a century and through their use has improved the quality of the service it is able to render. Just recently dental laboratories have explored the possibilities of electro-polishing and they are using it more and more for the treatment of stainless steel frameworks of partial dentures. Such electro-polished dentures will not harbor as many bacteria and are easier to keep clean and sanitary. The valued use by the dental profession of techniques developed in the laboratories and shops devoted to plating is a tribute to that industry. What new dental techniques will be developed in the next half century only time will tell. Very probably though, judging from the past, some of them will come from the workbenches of the plating industry.

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This is the type of article for which there has been a considerable demand by our readers. In it is recognized the fact that job shops encounter all sorts of quality in die-castings, and that to overcome this deviation in quality, these shops are forced to vary their plating procedures. Written by a practical man, the paper makes no claims for universal cure-alls, but simply reports the experience of one job shop in licking its problems in the plating of die-castings.

COPPER STRIKING ON ZINC BASE DIE-CASTINGS

IRVIN K. HAUSEMAN*

Introduction

This article, on problems encountered in copper striking, is written to describe how the problems encountered in plating zinc-base die-castings by one job shop were solved and with the thought that this information will prove helpful to other platers. Intensive studies relating to copper striking problems over a six-year period are reported along with different types of faulty plating and their remedies.

Reasons for Improper Plating

It has been found that the cause for a large percentage of plating troubles is improper copper striking. Therefore, it is well first to check there for trouble when difficulties arise. It is important to have an experienced operator working on the strike tank to assure best results. He must know what to look for; he must know what initial deposit will cover well in follow up plating operations; and he must recognize a bad looking strike. This operator can check for improper cleaning and rinsing and for water-breaks. His constant reports on how well the zinc base die-castings take a strike and what they look like after striking can be an important factor in quality control.

This constant checking is important in a fully hand operated plating department where manual mistakes in handling cause bad plating even though the system is working properly. There cannot be too much inspection or too many precautions taken. Everything may run properly for several hours and then, for some unknown reason, several racks of castings may be blistered or several pieces scratched. It may be that some employee was thinking, for the moment, not of his work but of the date the night before or the fight on TV; or he may have been talking to a fellow worker, and the result is work to strip and to replate.

Trouble, when it comes, can usually be picked up in and around the strike area, so some of the things the operator must watch for and pass judgment on will be discussed.

Types of Improper Plating

Dullness from Striking

A dull strike simply means one that will not brighten up in subsequent plating. The dullness may be caused by too high a current density, or by the work being in the strike too long, or by the temperature being too low. A dullness that shows here can come from the acid dipping being inadequate to remove the oxide left from the cleaner. If the strike is not high enough in metal content and the color is darkened by overexposure of the work in the strike, the high luster may not come back in the subsequent copper plating operation.

Some jobs may have to be left longer in the strike in order to hide a pattern; this means that a slower strike must be used to keep from burning the work.

Brassy Color from Striking

A brassy color from striking is related to the dull strike in that sometimes the surface becomes sufficiently dull so that a bright copper deposit cannot be obtained. A brassy color may result also from contamination with rather large quantities of zinc. The main cause of this condition has been found to be too light a strike. When the work is transferred to the plating tank it turns a brassy color, sometimes becomes streaked, brightens in patches, and is hard to copper buff. Slight amounts of chrome in the striking solution will also cause this condition which can be corrected by periodic additions of sodium hydrosulfite eg., once every 2 to 3 hours. The chromium contamination could be in the strike or in the copper plating

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tank and would give the same results. If chromium contamination is very high it can cause blistering, as will be explained under that heading.

Roughness from Striking

Roughness from the strike is particularly bad, because when copper and nickel are plated onto the rough surface the build-up of plating makes the slight roughness a sandpaper surface. Sometimes it becomes so rough that the copper deposit must be buffed and at times it is impossible to eliminate the roughness by buffing. There are times when, coming out of the strike, the slight roughness is hardly visible at a glance, but once in the copper the metal build-up soon shows the roughness on the top side of the work. Therefore, the roughness from the strike must be very closely watched. This is the first thing to check when roughness is encountered. In special cases continuous filtration is used and even then it is difficult to eliminate roughness altogether when operating at capacity. Additions should never be made to plating solutions during working hours because of the probability of causing roughness. When operating at full production, the anodes may darken and smut form on them. Later this smut will float off and collect on top of the solution and cause roughness. Cleaner drag-over from the racks can form a precipitate in the strike which also will cause roughness. It has been found that there is a greater tendency toward roughness when sodium cyanide is used instead of potassium cyanide at a free cyanide value of 1 oz/gal.

Pitting from Striking

Pitting from the strike actually appears as a sandy finish after copper and nickel plating but has no feel of roughness. Sometimes this pitting covers the entire surface of the work and at other times appears to start at the bottom and work up the sides of a casting to form lines or streaks. One cause of this condition is trapped acid in the pores of the metal still present when entering the strike. The cause may be an acid dip which is too strong. This condition may also be corrected by the addition of a wetting agent to the acid dip. Some castings are more porous than others and will show gas bubbles even after two rinses following acid dipping.

A pitting condition can also be caused by contamination of the strike with buffing compounds as well as from wetting agents being dragged over from the cleaner. Leaving a casting in the strike too long may cause a fine pitting pattern along the flow line pattern of a casting.

The only real cure is obvious. Better rinsing before the strike is required and at times continuous filtration must be employed.

Casting Pattern from Striking

One of the most difficult problems to solve is the pattern streaking caused by the flow lines of the die-castings. On some types of castings, the entire production may have flow lines. Some of the pattern may be covered in plating and in other cases nickel buffing may be required. It is reasonable, then, to believe that if conditions are right none of the castings should require nickel buffing. This condition has been attributed to poor castings, to the cleaner, and to the fact that there may be hard areas in castings that cause patterns to show very plainly after buffing and cleaning.

The fact that the strike seemed to cover the flow lines in some cases and at other times the pattern remained the same as before the piece had the copper strike, it appeared that the answer might be found by determining the proper conditions of striking. After consultation at different times with experts in the field, it was found that with conditions right and the operators running the cleaner and strike properly, all went well.

The conditions developed are as follows:

Instead of running a high metal strike (5.0 to 5.5 oz/gal) using duPont BH-661 salts, the copper content was dropped to 3.5 oz/gal, using copper cyanide. Free sodium cyanide was carried as before 1.0 oz/gal and 2.5 oz/gal of Rochelle Salts were added. The *p*H was raised from 10.5 to 12.5, and the voltage from 2 to 4 at the generator. Temperature was changed from 140° to 120° F. Time in the strike was changed from 10 to 15 seconds to 30 to 60 seconds. This gave a duller strike that would brighten later in copper plating. This very closely resembles Wagner's strike solution[1].

It is not good to have a wetting agent in the copper strike in most cases because it tends to produce a bright strike that will not hide the casting pattern. If the work is not highly buffed a high speed bright strike, with 1 ml/gal of a proprietary wetting agent, can be used that will plate enough copper in 7 to 10 seconds so that the work will not turn dark after transfer to the copper plating tank. But with a bright strike over a highly buffed surface, all the surface defects are reflected more clearly and nothing seems to cover well. For that reason a slow strike without wetting agents is recommended.

Blistering from Striking

Blistering is a common problem to the plater. When blistering is encountered, the work should be checked to see if it has been over-cleaned or over-acid-etched. Blisters probably will not show immediately at the strike, but conditions of cleaning and striking can weaken the bond of the deposit to the base metal so that the plating will blister later either in copper, nickel, or chromium plating, or in baking[2].

High chromium contaminations may cause blistering, as reported by Caldwell[3]. Sodium hydrosulfite may be used to reduce the hexavalent chromium to the trivalent state, but this procedure may not solve the problem entirely. This may be the result of the redissolving and/or re-oxidation of chromium hydroxide as reported by Wagner[1]. Continuous filtration has been found to be helpful in such cases.

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The standards of time, concentration and temperature reported have been found satisfactory for one job plating shop. For example, as noted previously, the temperature of the strike was dropped from 140° to 120° F in one special case where the equipment was pushed to its design limits to accommodate a lot of extra large pieces. In the transfer of this lot of work on its racks from the strike to the plating tank, it was observed that the die-castings dried prior to completion of the transfer. Solution also dripped from the upper pieces onto the dried lower positioned ones and again dried out in the new position. The result was a peeling of copper from copper. Lowering of the temperature in this special case was the answer to this problem, and having worked out well in one case, was adopted as the standard operating temperature from that time. Other plants having different set-ups may successfully use different procedures, even though they may be plating the same kind of work.

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Electrolytic Regeneration

(*Continued from page 1121*)

brass solution where it is necessary to replenish copper cyanide, it is more desirable to resort to continuous regeneration. For continuous regeneration an auxiliary tank approximately one-tenth in size to that of the plating tank is provided. This auxiliary tank is connected with the main plating tank by means of an overflow weir and a suitable circulating pump or filter. The tank is equipped with copper anodes and a regeneration cell. It is also provided with a suitable rheostat. For example—a 3,000-gallon white brass solution with a current capacity of 3,000 amperes will require only one cell and the total current required for regeneration will not exceed 300 amperes. Electrochemically, if 90 per cent of the amperes were used for zinc and 10 per cent used for copper, the ratio of metal entering the solution would be 82 per cent zinc and 18 per cent copper. This is true because the atomic weights of both metals are almost the same. Zinc is bi-valent and copper monovalent in the same solution. In actual practice, however, one must take into consideration that the cathode efficiency of white brass may be as low as 65 per cent and the zinc anode efficiency is above 100 per cent. Sufficient insoluble anodes must be used to compensate for the low cathode efficiency. The anode area can also be manipulated so that the anode can be polarized sufficiently to balance the poor cathode efficiency. With the aid of the regenerating tank; the copper may be raised or lowered as required and the amount required can be calculated accurately. It assures solution stability and eliminates the periodic addition of copper cyanide. Fig. 2 illustrates the auxiliary regenerating tank completely equipped with concentration cell, copper anodes, rheostat and circulating pump.

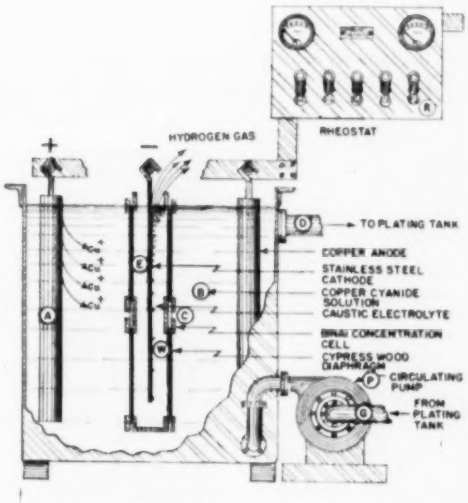

Fig. 2 Electrolytic Concentration System

SUMMARY

1. In a cyanide copper or a white brass bath, copper cyanide can be introduced by means of electrolytic regeneration. This can be done intermittently or continuously.

2. In alloy plating, one or more metals may be introduced to the electrolyte by means of electrolytic regeneration. Such additions may be controlled to equal rate of deposition.

3. To prevent cyanogen accumulation, cyanogen polymerization, carbonate increase, organic contamination, addition agent break down, it is desirable to replenish copper by means of electrolytic regeneration rather than by periodic copper cyanide addition.

4. In order to maintain a stable cyanide plating solution, it is necessary that the rate of metal plating out at the cathode be as near equal to the rate of metal entering the solution at the anode. This will minimize the free cyanogen concentration.

5. When wood diaphragms are employed, it is desirable that the solution temperature in the regenerating tank does not exceed 120° F. Wood, although an excellent diaphragm material, does not withstand high temperature. In cyanide copper plating where the operating temperature is around 160 to 180° F, it is necessary to provide cooling for the regenerating tank solution.

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JUNE, 1953

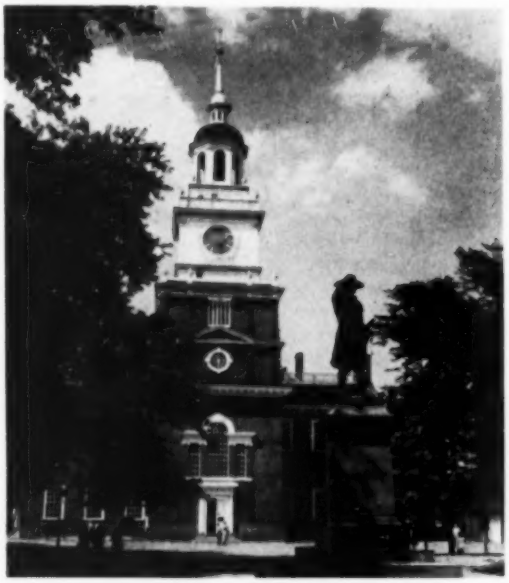
Philadelphia has much to offer in her role as host city to the 1953 Annual American Electroplaters' Convention next June 15-18. She is a city rich in monuments associated with the birth of our great nation; she is a city rich in the fields of culture, industry and entertainment; she is a city whose industrial future is one of the brightest of the nation.

For those who have not visited the city, the full significance of these claims may not be recognized. We want to tell you at this time why Philadelphia is of so much interest as a city, and why the city itself will contribute greatly towards making the 1953 convention a success.

The history of Philadelphia started in 1636 when a company of Swedes made their homes here on the shores of the Delaware. The community grew in commercial and political importance and it was here, between the years of 1763 and 1774, that most of the official events of the Revolution took place.

Many of the buildings used during this period have been preserved as museums. Probably the most outstanding example of this type of monument is famed Independence Hall originally the State House of Pennsylvania (1732). The Liberty Bell and the Declaration Chamber where the Continental Congress adopted the Declaration of Independence in 1776 may be seen here. It was in this building that the Federal Constitutional Convention framed the Constitution of the United States in 1787.

Modern Philadelphia is a city of diversified interests. For those interested in art there are the Museum of Art, the Rodin Museum, the Academy of Fine Arts and the University Museum. Other museums are too numerous to mention but one institution should most certainly be called to the attention of all platers. This is the Franklin Institute, popularly known as the "Wonderland of Science"; it contains 4,000 action exhibits of modern transportation, physics, chemistry and electricity. Some other points of interest are the Academy of Music, Robin Hood Dell, the theatres, and last, but far from least, the night clubs.



Independence Hall

Photo courtesy Chamber of Commerce of Greater Philadelphia

Listing such corporations as Philco, Budd, SKF, Henry Disston, Crown Can, Yale and Towne, and Heintz Manufacturing, indicates a rather astonishing variety in finished materials produced in the "City of Brotherly Love". While a city of diversified industry, it is the metals and metals products field that is most important. The metal industries represent 30 per cent of the industrial capital investment in Philadelphia and employ 30 per cent of the manufacturing labor.

One would be justified in calling Philadelphia a plating town. Independent of the big corporation manufacturers there are 76 plants and shops in Philadelphia who do contract electroplating. These 76 units represent every conceivable type of product ranging from fine jewelry work to massive, custom hard chrome plating jobs. It is planned to include a tour of several job shops in the plant visitation schedule during the convention week.

The growth of the steel industry in the Philadelphia area insures continued expansion of the metal processing industry. Even now plants designed to use steel supplied locally from the new Fairless Works are being constructed. The Fairless Works of the U. S. Steel Company is approaching completion and is expected to be in production before the end of this year. Another major steel corporation is currently planning an integrated mill to be built on the Jersey side of the Delaware River.

The inevitable aftermath of such an expansion in the steel and in the metal processing industries will be expansion in the plating field with new plants and considerable expansion of existing facilities. Philadelphia will be, more than ever, a plating town.

The 1953 Convention Committee, under the chairmanship of Dr. Samuel Heiman, Philadelphia Rust Proof Company, is planning a Convention that will be second to none from the standpoint of technical interest and of entertainment. Philadelphia is certainly the ideal city in which to hold such a meeting.

project No. 10

project director:
BARNETT F. DODGE*

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location:
YALE UNIVERSITY,
NEW HAVEN, CONN.

Acknowledgment is due the Research Committee, Mr. William Tucker, Eastman Kodak Company, Chairman; the Research Directing Sub-Committee, Mr. B. C. Case, Hanson-Van Winkle-Munning Company and Dr. R. M. Wick, Bethlehem Steel Company, Chairman and Vice-Chairman, respectively; and the Project Committee; Mr. Henry B. Smith, R. Wallace & Sons Mfg. Company, Chairman; Mr. L. A. Danse and Mr. D. Milne, General Motors Corporation, and Mr. F. J. Holt, E. I. du Pont de Nemours & Company, for their contributions to this project.

*AUTHORS

Disposal of Plating Room Wastes

IV. BATCH VOLATILIZATION OF HYDROGEN CYANIDE FROM AQUEOUS SOLUTIONS OF CYANIDES

Introduction

The removal of cyanide from electroplating solutions by volatilization of hydrogen cyanide (HCN) gas is one of the important methods now used for the treatment of wastes from electroplating operations in which cyanides are used.

A critical review of the literature[1,2] revealed that there were few quantitative data on the factors controlling this process, and it became one of the objectives of the program of Research Project No. 10 to provide such data.

The purpose of this paper is to present some results from small-scale laboratory experiments on the batch volatilization (as contrasted with a continuous-volatilization process which is also under study in this laboratory) of HCN gas, dealing mainly with the effect of the most important rate-controlling variables.

The batch-volatilization method of disposal may be effected in two ways: (1) by impounding cyanide-waste solutions in large shallow ponds, thus allowing the hydrogen cyanide to escape slowly, and (2) by acidifying the waste solution to a *p*H value at which most of the cyanide is present as hydrogen cyanide and accelerating the evolution of the latter by aerating the solution or passing steam through it.

In the second case, the volatilization of hydrogen cyanide is obviously more rapid than in the first case, and the process can be controlled so as to remove the desired quantity of hydrogen cyanide within the allotted time. Furthermore, in the first case, the rate of removal of hydrogen cyanide is dependent on the *p*H value of the waste and on prevailing atmospheric conditions, and it is therefore difficult to predict the time necessary for complete removal of cyanide. The second method also has another advantage over the first method, namely, that it offers more safeguards for humans and animals, because it is restricted to the plant area.

Neither method, however, destroys cyanide, but merely transfers it to the surrounding air, where it is diluted to concentrations which are not toxic.

Review of Previous Work

The disposal of cyanides by batch acidification of the solution, and volatilization of hydrogen cyanide produced, is described by Dodge and Reams[3] and by Bleiweis[1]. Most of the methods described involve acidification of the waste solution to a *p*H varying from 3 to about 7, and removal of HCN by aeration. The acidification is performed either by adding sulfuric acid or by bubbling through the cyanide solution a waste gas containing acid anhydrides, such as carbon dioxide or sulfur dioxide. The operation is usually performed in a tank lined with acid-resistant material and with a hood above the tank connected to a high stack, in order to dissipate HCN containing gases at such a height that there will be no possibility of hazardous concentrations of HCN reaching ground level. An alternate way, when using air, is that of absorbing the effluent in a caustic solution and re-

circulating the stripped air to the cyanide-disposal unit. The purpose of recirculation is to increase the absorbing capacity of the caustic absorber by using air which is practically free of carbon dioxide.

Theory

The reaction between a mineral acid and the cyanide ion, whether the latter is present in a free or complex form, results in the formation of hydrogen cyanide which is very volatile, since its boiling point is 26° C (78.8° F) at atmospheric pressure.

The removal of HCN from a liquid solution is assumed to be affected by the following main variables: (1) *p*H value, (2) concentration of the cyanide, (3) composition of the solution, (4) temperature, (5) rate of aeration, and (6) method of contact between the solution and the gas or vapor used to strip HCN from the solution.

The *p*H value is an indication of the percentage of total cyanide which has been converted into hydrogen cyanide. The concentration of cyanide in solution determines the amount of HCN produced and consequently the partial pressure* of HCN immediately above the solution, i.e., at the interface between the liquid and the surrounding gas. The partial pressure is related to the concentration of HCN in the liquid by an equilibrium constant called the Henry's Law constant (H), which may be independent of concentration in a very dilute solution and of total pressure, provided the latter is nearly atmospheric; however, it is affected by the temperature of the solution, which is one of the variables mentioned above.

The difference between the partial pressure of HCN in equilibrium with the concentration of HCN in the solution and that in the gas used for stripping is one of the factors determining the rate at which the hydrogen cyanide is stripped from the solution. Stripping can only occur if the former partial pressure is higher than the latter, and the rate increases as this difference increases.

In this particular investigation all runs were conducted under unsteady-state conditions, meaning primarily that the concentration in the liquid and gas phases varied with time. This is usually the case in batch operations of this type.

Batch stripping may be conducted in two ways:

(1) The solution is exposed in an open container to the surrounding air, and the volatile solute is allowed to escape into the atmosphere.

(2) The solution is aerated by a gas or vapor which is introduced in fine bubbles to the solution through a number of small orifices.

In both cases it is common practice to correlate experimental results by using mass-transfer coefficients (K_G), which are rate coefficients. These are expressed in terms of number of moles of volatile solute evolved per unit time, per unit drop in partial pressure between the gas-liquid interface and the bulk of the gas, per unit of interfacial contact area between the gas and the liquid. In the first case described above, the interfacial contact area is the value of the top-surface area of the liquid; in the second case it is the value of the interfacial area per unit volume of the liquid-gas mixture, which depends on such factors as degree of agitation of the liquid and degree of dispersion and size of the gas bubbles.

The following expressions may be derived, which are used for calculations of mass-transfer coefficients from experimental data:

$$\text{Case 1.} \qquad K_G = \frac{N_A}{A(\Delta p)_m} \qquad \text{(a)}$$

$$\text{Case 2.} \qquad K_G a_v = \frac{N_A}{V(\Delta p)_m} \qquad \text{(b)}$$

The symbols used in these equations are explained in the section on Nomenclature.

If these mass-transfer coefficients are calculated throughout a practical range of experimental variables, it is possible to relate these coefficients to the variables by means of an empirical correlation. Once this has been done, it is possible to predict the stripping performance of a system at any point in the investigated range of variables. Sometimes, with little experimental work, this empirical correlation may be extended to apply to other stripping systems.

Apparatus, Analytical Procedures and Reagents

Ordinary laboratory glassware, such as beakers, test tubes and wide-mouthed bottles, was used for the studies of batch-volatilization of HCN from cyanide solutions. In the runs without aeration, the concentration of cyanide throughout the solution was kept constant at any one time by a mechanical stirrer rotating at such a rate as to avoid the formation of a vortex at the surface of the solution. In the runs with aeration, either an extra-coarse fritted-glass diffusing tube, with a maximum pore-size of 160 microns (0.16 mm), or a single 5-mm orifice was used.

A modified Othmer equilibrium still[6] was used to determine vapor-liquid equilibria for the system hydrogen cyanide-water at temperatures from 18° to 100° C (64.4° to 212° F). The dilute hydrocyanic acid solution (less than 4000 ppm HCN) was prepared by distilling hydrogen cyanide from an acidified sodium cyanide solution into distilled water. On the basis of preliminary experiments it was determined that equilibrium was reached in 1–1½ hours after the solution had reached the desired temperature; therefore, to be on the safe side, a contact time of 2 hours was used.

A Beckman Model M *p*H meter was used to measure *p*H.

The cyanide solutions were analyzed by the modified Liebig titrimetric method, using KI indicator for the determination of cyanide concentrations above 10 ppm of CN, and p-dimethylaminobenzalrhodanine indicator for cyanide concentrations below 10 ppm of CN.

Air rates were measured with a capillary-glass flowmeter connected to a measuring U-tube manometer. This flowmeter had been calibrated in the lower range by measuring the weight of water displaced per unit time, and in the upper range by the use of a gas wet-test meter.

The solutions investigated were pure alkali-metal cyanide and synthetic copper or zinc plating solutions. They were diluted to an initial concentration of total cyanide (CN) of 10–1000 ppm from synthetic stock solutions having the following composition:

	g/l
1. Copper plating solution	
Cuprous cyanide	45
Sodium cyanide	68
Sodium carbonate	30
2. Zinc plating solution	
Zinc cyanide	60
Sodium cyanide	41
Sodium hydroxide	79

The volumes of solutions used varied between 200 and 800 ml.

Discussion of the Experimental Work

The experimental work may be subdivided into the following sections:

I. Determination of Henry's Law constants (solubility constants) at temperatures from 18° to 100° C (64.4° to 212° F).

II. Determination of the *p*H value at which more than 99 per cent of the cyanide is present as hydrogen cyanide in (a) pure cyanide solutions and (b) solutions containing metal cyanide complexes.

III. Determination of rate of evolution of hydrogen cyanide from agitated solutions in which the cyanide composition is the same throughout the solution at any one time. The solutions are exposed to air under conditions of free convection.

IV. Determination of rate of evolution of hydrogen cyanide from stagnant cyanide solutions such as those that are encountered in ponds, exposed to air under conditions of free convection.

V. Determination of rate of evolution of hydrogen cyanide from solutions thoroughly agitated and aerated by bubbling air.

*Partial pressure of a gas in a mixture of gases is defined as the pressure that a gas would exert if it *alone* occupied the volume of the mixture at the same temperature.

The main variables investigated were: *p*H, concentration of cyanide, composition of the solution, time, temperature and rate of aeration.

I. Henry's coefficients were determined experimentally at temperatures higher than 18° C (64.4° F), the only temperature for which vapor-pressure data were available[4], to obtain values of the vapor pressure of HCN from very dilute solutions over the range of temperatures investigated; these values were required for the calculation of over-all stripping coefficients.

II. The determination of the maximum *p*H at which most of the cyanide is present as undissociated HCN gave the necessary information on the degree of acidity required to transform the cyanide ion into a volatile compound. In the experiments that led to this information it was also possible to determine the acid requirements to bring the *p*H of the solution down to the desired value.

III & IV. These two topics actually cover two phases of the same investigation, which was concerned with the evolution of HCN from impounded solutions. In the first phase, III, the solution was agitated to keep the concentration of cyanide constant throughout the solution at any one time, and the degree of agitation was such that it did not cause the formation of a vortex in the top surface of the solution. In the second phase, IV, the solution was not agitated. Thus it was possible to study the effect of depth of the solution on the rate of evolution of cyanide, starting with a solution where the effect of depth was eliminated by gently stirring the solution, to avoid formation of a vortex at the top surface, and continuing with unagitated solutions with depths varying from 1.375 to 6 inches (35 to 150 mm)*.

V. The study of the evolution of hydrogen cyanide from solutions thoroughly agitated and aerated by bubbling air was undertaken to obtain quantitative results on a method which is practiced by some electroplaters and for which not enough quantitative information is available. The final aim of this particular investigation was to obtain the necessary quantitative information to design a cyanide-acidification disposal plant.

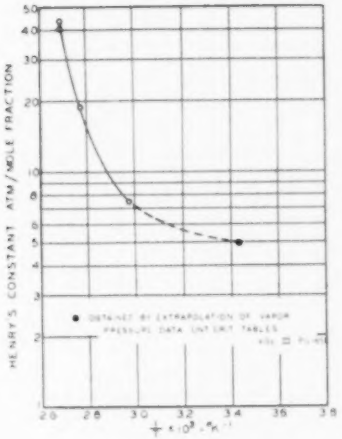

Fig. 1. The effect of temperature on the Henry's Law constants for very dilute hydrocyanic acid solutions (less than 0.4 per cent HCN)

Temperature ° *C*	*H atm/mole fraction*
18	*5 0*
64	*7 5*
85 5	*18 4*
100	*43 1*

Discussion of Results

I. *Henry's Law constants*

The Henry's law constant (*H*, a solubility constant) was determined experimentally at 64 (147), 85.5 (186), and 100° C (212° F), by using very dilute solutions (4000 ppm of HCN). The only information available in the literature was on the vapor pressure of hydrogen cyanide above different concentrations of aqueous hydrocyanic acid solutions at 18° C (64.4° F)[4]. From this information, a value of *H* for infinite dilution was obtained by the authors, using graphical extrapolation (in cartesian co-ordinates) of a curve relating values of *H* to mole fraction of HCN in water, to zero mole fraction, or infinite dilution. The lowest mole fraction for which a value of *H* was previously available was 0.05 corresponding to 7.48 per cent by weight of HCN.

The experimental values obtained and their relation to temperature are shown in Fig. 1, where the logarithm of *H* is plotted versus the reciprocal of the temperature in °Kelvin†. This curve includes the experimental values of *H* determined by the authors and the value which was extrapolated from the data given by the literature. The assumption was made that the value of *H* in a solution containing 4000 ppm of HCN was the same as that of infinitely dilute solution‡. The *H* curve was plotted against the reciprocal of the absolute temperature†, instead of the regular temperature, because it gave a curve which was less steep in the low temperature region. From this curve it may be deduced that the increase of *H* with temperature is small and gradual up to a temperature of about 65° C (149° F) and that it increases rapidly above 65° C. This fact indicates that the rate of volatilization of HCN is considerably enhanced by a temperature rise, particularly above 65° C, since the vapor pressure above the solution is directly proportional to *H*.

II. *Determination of* p*H at which free and complex ions are decomposed almost completely in the form of undissociated hydrocyanic acid*

This study was subdivided into two parts, one part involving free cyanide ions only, the other involving complex ions. The nature of the first part was such that it was possible to calculate the results, without any experimental investigation, from the knowledge of equilibrium constants and other physical data. However, in the second part, the lack of physical data made experimental work necessary.

(a) *Solutions containing free cyanide ion.* —It is found by calculation that more than 99 per cent of the total cyanide is present as molecular HCN if the *p*H of a solution containing only free cyanide is lowered to about 6.5. This calculation may be performed, given the *p*H, initial cyanide concentration [C] and the dissociation constant K_a of HCN in water. A sample calculation is shown in the Appendix.

In this calculation, the assumption is made that the solution contains only undissociated HCN and the following ions: hydrogen, hydroxyl, sodium and cyanide.

On the basis of the following equation:

$$Na^+ + HCN = H^+ + CN^- + Na^+ \quad (1)$$

the expression for the dissociation constant may be written as follows:

$$K_a = \frac{[H^+]\,[CN^-]}{[HCN]} \quad (2)$$

*This depth is probably much smaller than the average depth of an impounded cyanide solution, but it is sufficient to give qualitative information on the effect of liquid depth on the rate of volatilization of HCN from an impounded solution. The dependence of these results on widely varying atmospheric conditions would make a quantitative investigation of this problem rather difficult.

†Kelvin = ° C + 273.2.

‡It was also assumed that these vapor–liquid equilibria for HCN, which were obtained experimentally, could be used for calculations of solutions containing metals such as in plating waste solutions; i.e., it was assumed that the dissolved metal salts in the acidified solution (metal sulfates) had no effect on the HCN equilibrium.

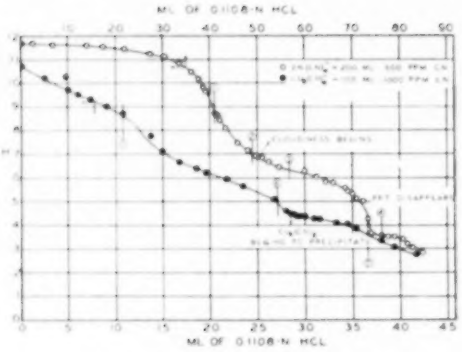

Fig. 2. Potentiometric titration curves for synthetic copper and zinc plating solutions. The points indicated by circled numbers were determined by stoichiometric calculations, namely, on the zinc solution curve, (1) = OH^- neutralized, (2) = free CN^- neutralized, (3) = $Zn(CN)_2$ completely precipitated, (4) = $Zn(CN)_2$ completely decomposed (more than 99.5 per cent of the cyanide is present in the form of molecular HCN); in the copper solution curve, (5) $CO_3^=$ neutralized, (6) free CN^- neutralized, (7) $Cu_2(CN)_2$ completely precipitated.

Since at any time

$$[CN^-] = [C] - [HCN] \qquad (3)$$

equation (3) may be substituted in equation (2) to obtain the following expression:

$$K_a = \frac{[H^+]([C] - [HCN])}{[HCN]} \qquad (4)^*$$

where $[H^+]$ = —antilog (pH)

By the use of equation (4) it is possible to calculate the amount of undissociated HCN present from the pH and the concentration of total cyanide. (See sample calculation on p.14).

(b) *Solutions containing free cyanide and metallo-cyanide complexes.*—Two dilute synthetic metal plating solutions were used for this investigation, one being a copper plating solution (100 ml) containing 1000 ppm of total CN, the other a zinc plating solution (200 ml) containing 500 ppm of total CN. Each of the two solutions was titrated potentiometrically with 0.1108-N HCl, using a glass-calomel electrode. The results are plotted in Fig. 2.

Before Fig. 2 is discussed, it may be quite helpful to present an introductory description of the reaction between an acid and cyanide present in the form of free and metallo-complex ion: Free cyanide is neutralized first, being converted into HCN; the metallo-complex ion is then decomposed into an relatively insoluble metallic cyanide and HCN, followed by a decomposition of the metallic cyanide into metal ion and HCN. The two curves obtained in Fig. 2, together with visual observation of formation of metal-cyanide precipitates, may be used to give a clear picture of the successive neutralization reactions which take place during the addition of acid, and of the actual acid requirements. The circled numbers pointing at different sections of each curve *are based on calculated stoichiometric acid requirements* for each reaction. For example, in the curve representing the titration of the dilute zinc plating solution, number 1 represents the theoretical point at which all of the hydroxyl should be neutralized. (Any hydroxyl ion is neutralized first.) The position of number 1 is somewhat lower than expected. It should correspond to a pH of about 11 where the

*$K_a = 7.2 \times 10^{-10}$ at 25° C. It is believed that the presence of other ions, such as sulfates or chlorides, does not affect appreciably the value of the ionization constant.

TABLE I. VOLATILIZATION OF HCN FROM CYANIDE SOLUTIONS GENTLY STIRRED BY MECHANICAL AGITATION

Run No.	Soln Vol ml	Initial Total CN Conc ppm	Type of CN Soln	pH of Soln after Buffering	Initial Conc of HCN as CN ppm	Time of Agitation hr	Ratio of Hgt to Diam of Container	Average Temp °C	Final Total CN Conc ppm	Final Conc of HCN as CN ppm	K_G§ lb-mole/ hr.ft².atm
42	150	500	Na	4.60†	500	1.000	0.3	23	240	240	0.0375
43	150	500	Na	2.55*	500	0.500	0.3	23	388	388	0.0257
54	200	500	Na	10.50*	20.8	2.500	0.4	26	479	20	0.0254
55	200	100	Na	10.15*	8.8	2.217	0.4	24	92.5	8.1	0.0315
55a	200	100	Na	10.15*	8.8	2.217	0.4	24	92.5	8.1	0.0315
56	200	10	Na	9.60*	2.6	1.250	0.4	24	8.8	2.4	0.0254
64	200	100	Na	2.50*	100	0.667	0.4	70	19.5	19.5	0.1150
81	200	200	Na-Cu	2.50*	148	2.833	0.4	29	93.7	45.7	0.0306
82	200	100	Na-Zn	2.50*	100	1.667	0.4	28	36.2	36.2	0.0215
28	400	100	Na	2.00*	100	0.584	0.8	24	57.3¶	57.3	0.127**
29	400	100	Na	6.45‡	96.4	3.100	0.8	24	1.56¶	1.56	0.181**

*Potassium biphthalate–hydrochloric acid buffer
†Sodium acetate–acetic acid buffer
‡Monobasic potassium phosphate–sodium hydroxide buffer
¶Turbulent agitation with formation of vortex
§Average K_G at room temperature = 0.0286; max % deviation = —25 per cent
**Vigorous agitation

curve should bend down rather abruptly. However, the presence of other ions such as the cyanide ion may have an effect on the shape of the curve. Furthermore, it is quite possible that some of the cyanide begins to react before all of the hydroxide has been neutralized. Number 2 shows the point at which all of the OH^- and free CN^- ions have been neutralized; it may be seen that near this point cloudiness was observed, indicating that the complex cyanide ion had begun to decompose with consequent precipitation of zinc cyanide. The curve also shows that the complex zinc cyanide ion is unstable below a *p*H of 6.9. Number 3 should correspond to the point where $Zn(CN)_2$ has been completely precipitated. This was also observed visually. Number 4, which should correspond to the point at which $Zn(CN)_2$ had been decomposed completely, indicates a somewhat larger HCl titer than actually used. By visual observation it was noticed that the $Zn(CN)_2$ had been decomposed completely at a *p*H of 4.5–5, as checked by the sudden drop in the curve upon addition of a relatively small amount of acid. The sudden subsequent flattening of the curve is inexplainable unless there be some buffering action.

In the curve representing the potentiometric titration of a dilute copper solution, number 5 corresponds to the point at which all of the carbonate has been converted to bicarbonate, as confirmed by the *p*H of 8.7, which should be the *p*H of a bicarbonate buffer solution, and by a change in shape. Number 6 corresponds to the point at which all of the free cyanide has been neutralized, as evidenced by the formation of a precipitate of copper cyanide which indicates decomposition of the complex cyanide ion. The *p*H at which this occurs is about 4.5. This indicates that the cupro-cyanide complex ion is more stable in the presence of acids than the zinc-cyanide complex ion, since the latter begins to decompose at a *p*H of 6.9.

About twice as much acid is required for the zinc plating solution as for the copper plating solution (although both solutions contain the same amount of total cyanide) because the former contains a much higher stoichiometric amount of alkali than the latter.

The acid requirements are about 3.24 lb of HCl per lb of total CN (4.35 lb H_2SO_4 per lb of CN) for the acidification of the synthetic zinc plating solution, and about 1.52 lb of HCl per lb of CN (2.04 lb H_2SO_4 per lb of CN) for the acidification of synthetic copper plating solution*.

A comparison between the two potentiometric curves shows that a final *p*H of 3.5 is sufficient to convert the readily decomposable cyanide into hydrogen cyanide†.

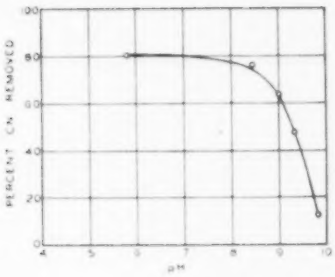

Fig. 3. Effect of pH on the evolution of HCN during 22.3 hours from a stagnant 6½-inch deep sodium cyanide solution at 74–80° F

III. *Evolution of hydrogen cyanide from agitated solutions*

The results of this investigation are tabulated in Table I. Values of K_G, the over-all stripping coefficients, were calculated on the basis of the initial and final concentration of molecular hydrogen cyanide, using the following expression:

$$K_G = \frac{N_A}{A\,(\Delta p)_m} \qquad (5)$$

where N_A represents moles of HCN evolved per unit time, A the surface area of the solution in contact with the air, and $(\Delta p)_m$ the logarithmic mean of the difference between the partial pressure (of HCN) at the gas-liquid interface and in the bulk of the surrounding air at any time.

The main assumption made in the calculation of K_G was that the partial pressure of HCN in the bulk of the surrounding gas was so small in comparison to the partial pressure exerted by the cyanide solution that it could be considered zero. This involved the assumption that free-convection currents and the relatively large volume of air above the solution would contribute to a relatively rapid dissipation of HCN throughout the air in such a way as to make the partial pressure of HCN negligible in comparison to that exerted by the solution at any time.

The results obtained (Table I) show that K_G increases with temperature but is unaffected by the concentration of cyanide, type of cyanide present, and *p*H value. The average value of K_G was found to be 0.029 lb-mole/hr.ft².atm at room temperature. The maximum deviation from the mean was −25 per cent. Such a deviation is not unusual in values of absorption or desorption coefficients because of inherent experimental difficulties. From run 64 it may be observed that a temperature increase of about 45° C (81° F) increases K_G four-fold. Also, the effect of turbulent stirring on K_G seems appreciable (see runs 28–29) mainly because this value was calculated on the basis of the cross-sectional area of the container, not on the actual area of contact between the air above and the liquid, which could not be measured because of turbulence.

IV. *Evolution of HCN from stagnant solutions*

The results of this investigation are shown in Table II. This research was undertaken to obtain some qualitative information on the rate of volatilization of HCN from stagnant cyanide solutions such as those found in waste-disposal ponds. Only sodium cyanide solutions were investigated, since solutions containing metallo-cyanide complexes behave similarly with respect to the rate of removal of cyanide. (See Table I, runs 81 and 82.)

The concentration of HCN, which is the volatile cyanide component, may be calculated stoichiometrically from the total initial amount of cyanide, the *p*H value, the concentration and type of metal present in solution, the dissociation constant of hydrocyanic acid and that of the metallo-cyanide complex. (See sample calculation on p. 14.)

At alkaline *p*H values, the rate of evolution of HCN is less than that for solutions of equal cyanide concentration at acidic *p*H values, because a smaller percentage of the total cyanide is present as molecular HCN. Furthermore, the rate of evolution of HCN decreases considerably after all of the free cyanide has been removed, since the only free cyanide left in solution is that which is in equilibrium with the complex metallo-cyanide ion and the metal-cyanide precipitate. Its value may be approximated by calculation and is rather small in comparison with the total cyanide present†.

The effect of *p*H on the rate of evolution of HCN from a stagnant cyanide solution is shown in Fig. 3. As the *p*H value of the solution is lowered from about 10, the rate of evolution of HCN increases until a *p*H of about 6 is reached, at which most cyanide is present as HCN; therefore, a further lowering of the *p*H should not increase the rate of evolution of HCN. These results are of course qualitative and

*These values will vary depending mainly on the hydroxide or carbonate to cyanide ratio.

†Copper cyanide, which does not readily decompose even in the presence of a large excess of sulfuric acid, may be either recovered, purified by washing and reused, or periodically dumped from the treatment tank into a much smaller container, where it can be decomposed in a relatively short time by adding sulfuric acid in the presence of chlorides (preferably magnesium chloride) and heating to at least 80° C (176° F), as it is usually done in the analytical determination of cyanides involving distillation.

TABLE II. VOLATILIZATION OF HCN FROM SODIUM CYANIDE SOLUTIONS WITHOUT MECHANICAL AGITATION

Run No.	Soln Vol ml	Initial Total CN Conc ppm	*p*H of Soln after Buffering	Initial Conc of HCN as CN ppm	Time of Volatilization hr	Hgt of Soln inch	Ratio of Hgt to Dia of Container	Average Temp. °C	Final Total CN ppm	Final HCN as CN ppm
1	50	100	9.80	18	22.33	6.5	6.5	25	87.5	15.7
2	50	100	9.30	40.8	22.33	6.5	6.5	25	56.2	22.9
3	50	100	8.45	83.0	22.33	6.5	6.5	25	23.4	19.4
4	50	100	9.00	58.0	22.33	6.5	6.5	25	35.9	20.8
5	50	100	5.80	100	22.33	6.5	6.5	25	19.2	19.2
7	200	100	6.45	99.6	18.833	1.375	0.4	25	3.64	3.63
8	300	100	6.45	99.6	18.833	2.000	0.6	25	9.9	9.87
9	400	100	6.45	99.6	18.833	2.75	0.8	25	15.6	15.55
10	500	100	6.45	99.6	18.833	3.50	1.0	25	22.9	22.85
24	200	100	2.20	100	4.333	1.375	0.4	26	26.6	26.6
25	300	100	2.20	100	4.333	2.000	0.6	26	41.6	41.6
26	400	100	2.20	100	4.333	2.75	0.8	26	52.0	52.0
27	500	100	2.20	100	4.333	3.50	1.0	26	62.5	62.5
30	200	500	6.95	495	18.416	1.375	0.4	23	17.2	17.0
31	300	500	6.95	495	18.416	2.000	0.6	23	46.8	46.3
32	400	500	6.95	495	18.416	2.75	0.8	23	83.1	82.3
33	500	500	6.95	495	18.416	3.50	1.0	23	127.1	125.5
34	200	500	2.55	500	2.6	1.375	0.4	22	317	317
35	300	500	2.55	500	2.6	2.000	0.6	22	344	344
36	400	500	2.55	500	2.6	2.750	0.8	22	367	367
37	500	500	2.55	500	2.6	3.50	1.0	22	400	400
38	200	500	4.60	500	3.1	1.375	0.4	22	267	267
39	300	500	4.60	500	3.1	2.000	0.6	22	307	307
40	400	500	4.60	500	3.1	2.750	0.8	22	.....	.....
41	500	500	4.60	500	3.1	3.500	1.0	22	386	386
20	200	1000	9.40	88.5	17.416	1.375	0.4	26	250	22.1
21	300	1000	9.40	88.5	17.416	2.000	0.6	26	286	25.4
22	400	1000	9.40	88.5	17.416	2.750	0.8	26	338	30.0
23	500	1000	9.40	88.5	17.416	3.500	1.0	26	463	41.0
13	200	10	6.45	9.96	18.25	1.375	0.4	26	0.156	0.155
14	300	10	6.45	9.96	18.25	2.000	0.6	26	1.17	1.16
15	400	10	6.45	9.96	18.25	2.750	0.8	26	1.93	1.92
16	500	10	6.45	9.96	18.25	3.500	1.0	26	2.4	2.39
50	200	10	2.20	10	2.166	1.375	0.4	23	6.24	6.24
51	300	10	2.20	10	2.166	2.000	0.6	23	6.75	6.75
52	400	10	2.20	10	2.166	2.750	0.8	23	7.28	7.28
53	500	10	2.20	10	2.166	3.500	1.0	23	8.31	8.31
44	200	200	10.35	11.6	18.75	1.375	0.4	22	140.5	8.11
45	300	200	10.35	11.6	18.75	2.000	0.6	22	156.0	9.04
46	400	200	10.35	11.6	18.75	2.750	0.8	22	173.5	10.1
47	500	200	10.35	11.6	18.75	3.500	1.0	22	187.0	10.8

show only a trend. A more extensive research would be necessary to give a quantitative picture of the rate of volatilization of HCN from stagnant solutions. This additional information would probably not be very useful for predicting the behavior of an impounded solution, which is usually exposed to varying climatic conditions.

The rate of evolution of HCN from a stagnant solution is very much affected by the depth of the solution. Because the diffusivity of HCN in water is about 1/10,000th of the diffusivity of HCN in air*, as soon as the surface of the solution becomes depleted of HCN, the rate of removal of cyanide from the solution by volatilization becomes entirely dependent on the rate at which the molecules of HCN migrate from the bottom to the top of the solution. Hence, the rate of evolution decreases considerably.

*Diffusivity of HCN in air = 0.766 ft²/hr at 20° C (68° F). The value at this temperature was had by conversion of an experimental value obtained at 0° C (32° F) by Klotz and Miller, **J. Am. Chem. Soc. 69**, 2557–8 (1947). Diffusivity of HCN in water = 6.68×10^{-4} ft²/hr at 20° C (68° F). This value was calculated by Wilke's method, Chem. Eng. Prog. **45**, 218 (1949).

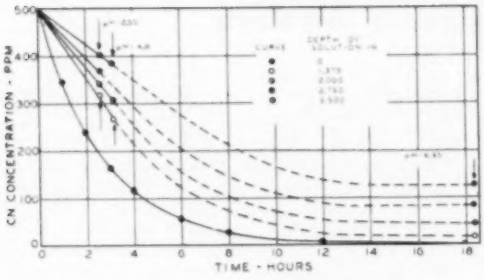

Fig. 4. Effect of depth of solution on rate of evolution of HCN from a stagnant solution containing initially 520 ppm of HCN. The curve representing "zero" height was calculated on the basis of an average of the values K_G for solutions where the effect of depth is eliminated by gentle agitation as shown in Table I

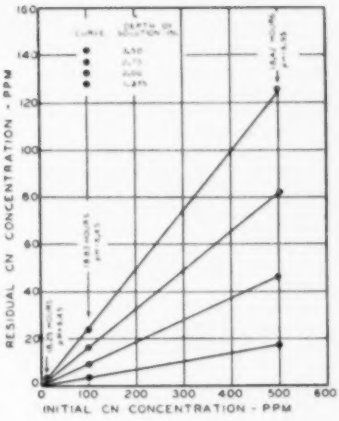

Fig. 5. Effect of initial concentration of HCN on amount of HCN volatilized from a stagnant solution

The effect of depth of solution on the average concentration of the residual cyanide* is shown in Fig. 4. In this graph, the residual cyanide as a function of time for "zero" depth was calculated by using the average value of K_G from Table I.

The effect of initial concentration on the average concentration of residual cyanide for the same time of treatment in stagnant solutions is shown in Fig. 5. It is rather significant to observe that these residual concentrations are straight-line functions of the initial concentration for the same depth of solution. If this fact could be generalized, it would mean that it is possible to predict fairly accurately and with little experimental work, the time necessary for the removal of cyanide, as HCN, from solutions which have different initial cyanide concentration, assuming, of course, that very similar atmospheric conditions prevail.

(*To be continued*)

*The average concentration of residual cyanide was determined by thorough mixing prior to sampling of the entire solution being investigated.

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Allotment and DO numbers and symbols. A revised list of August 26 contains two additional authorized symbols: B-7 Certain stockpile requisitions by Department of Defense; C-6 Direct Defense needs for friendly foreign nations excluding Canada (C-7), and foreign military construction (C-2).

Aluminum and Copper.—The Aluminum Producers Industry Advisory Committee at its meeting of September 3 recommended to NPA that stockpiling of aluminum be deferred in the fourth quarter of this year until a future date when the aluminum supply would be greater due to the production of new facilities in 1953. This action was recommended because of the possibility of a great loss in aluminum production due to power shortages in the Pacific northwest. The present loss of 10,000,000 pounds of aluminum production in that Pacific area may reach a total of 119,000,000 pounds by the end of the year unless there is an immediate and prolonged rainfall which is considered unlikely.

Decorative use of aluminum and copper are now permitted on consumer goods as a result of amendments to NPA orders M-47A and M-47B announced on August 4. The amendments do not allow any allotment increases, but do permit a manufacturer to use those allotments as he pleases since the end-use is no longer controlled.

Other actions removing some of the restrictions on the use of aluminum and copper were announced the same day and are as follows: Amendment of Revised CMP Regulation No. 6—the basic construction order; amendment of Order M-100—the housing construction order; amendment of order M-77—communications; and revocation of order M-74—the use of copper in building materials.

Nickel.—A measure of relief to the hard-hit electroplating jobbers was granted when Schedule 1 of order M-80 was amended, effective September 3, to permit the use of nickel in a "strike" of up to an average thickness of 0.00005 of an inch under chromium on articles where such use had been prohibited previously. The action does not involve additional allocations of nickel anodes or chemicals to the electroplating industry. Inasmuch as shops are now allowed to use their allocations on jobs such as replating and refinishing, it is expected there will be, according to NPA, a pick-up in business of non-industrial and non-defense areas and result in higher employment levels in job shops.

Concerning this same general order M-80, effective October 1, authorization for the purchase and use of alloying materials will be issued covering a three-month instead of a one-month period. All other reporting provisions of M-80 remain in force and the electroplating industry is warned that alloying materials will continue to be allocated to their suppliers who will receive their allotments on the new three-month basis.

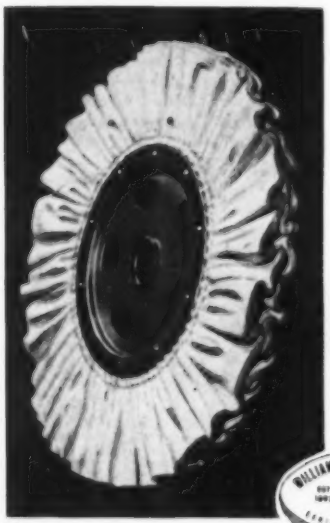
Platinum.—Manufacturers of jewelry and other items on the prohibited list are permitted to receive from refiners for re-use all platinum reclaimed from their platinum scrap materials under an amendment to NPA order M-54 issued August 14.

Rubber.—In an amendment to rubber order M-2 issued on August 29 controls on the purchase of cold synthetic rubber were removed.

Selenium.—Continued tightening of selenium supplies was noted in the report of a meeting on August 28 of the Selenium Rectifier Stack Manufacturers Industry Advisory Committee, which also unanimously recommended that order M-91 be continued. This order controls the distribution of selenium for all uses.

Sulfuric Acid.—Order M-94 which imposed distribution controls on sulfuric acid was revoked, effective as of August 19.

Tin.—NPA order M-8 was amended on August 1 to permit the private importation of tin. The allocation of tin is continued, however.



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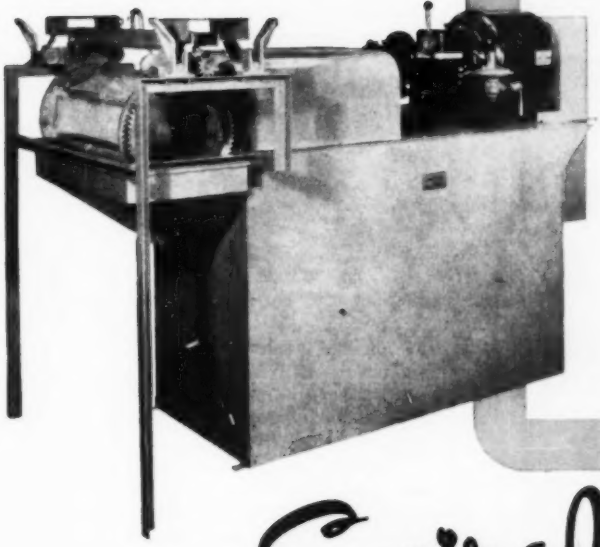

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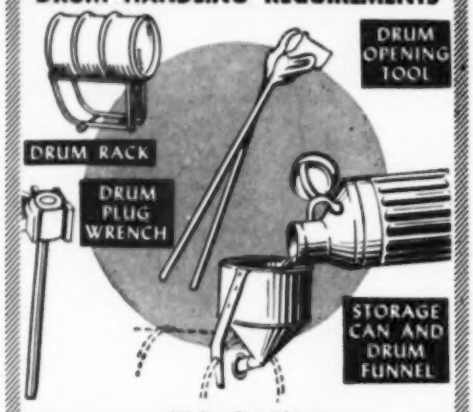

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Book Review

DR. HAROLD J. READ
Professor of Metallurgy, Pennsylvania State College

CORROSION—CAUSES AND PREVENTION by Frank N. Speller, 3rd edition, 1951, xiii + 686 pages. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 18, N. Y. Price, $10.00.

In view of the widespread occurrence as well as the economic importance of corrosion, it is somewhat surprising that so few good, general, comprehensive discussions of the subject have appeared in the English language. This may be due to the scarcity of authors who possess both the necessary writing skill and the requisite knowledge of a vast, complicated and confused body of information and misinformation. Dr. Speller's long and notable career as a corrosion engineer who has practised in a wide variety of problem fields has fitted him admirably to assess properly the available information, and he possesses the ability to present his distilled knowledge in a concise and lucid fashion. His book is comprehensive, which means that any individual subject cannot be treated at great length; still, as one reads the book there is seldom the feeling that any subject has been neglected.

The first section of the book is devoted to fundamental principles. After a discussion of the general theories of corrosion, the succeeding chapters deal with the influences of manufacture and treatment of metals, of factors internal to the metal (composition) and of factors external to the metal (environment). Descriptions of methods of corrosion testing along with comments on the principles involved therein conclude the first section. All of this material is presented with sufficient data in tabular or graphic form to prove the author's points, but the text is not cluttered with details of the experimental techniques which were employed in gathering these data. Adequate references are given to guide those who may wish additional details. Corrosion involving the direct combination of a metal with an element, such as oxidation, is treated in a very cursory manner, and the author does not present any of the more recent and esoteric work in the field. His attention is directed mainly to corrosion by aqueous solutions.

The second section, comprising somewhat more than half the text, is a survey of the multitudinous measures which can be taken to prevent corrosion. This is not a simple cook-book recital. It is, rather, a logical discussion of the proper spheres of usefulness of the many preventive techniques which are available, although sufficient descriptive material is included to make clear the nature and the mode of application of each technique.

Those who possess the second edition will find that the new edition contains much new material scattered through the text as well as completely new sections on biological factors in corrosion and on cathodic protection.

QUESTION BOX

readers' questions of general interest

Q. 145. Will you send us as much information as possible regarding the exact procedure to hard chromium plate to a thickness of 0.010 inch on 18 and 8 stainless steel?

A. The best way to handle stainless today is by using the new Unichrome plating solution. If this is not available, then reverse etch in a chromic acid etch bath at 100 a.s.f. for 1–5 minutes, depending upon what gives the smoothest results. Then treat as an "add-plate" job; that is, build up the current density in the plating solution very slowly over a period of 15 minutes, to the regular plating current density.—ART LOGOZZO.

Q. 146. We manufacture a product that consists mainly of small aluminum stampings that should be brightened by a chemical dip. Could you advise us as to sources of such material?

A. The subject of bright dipping aluminum was discussed at the Milwaukee Convention of the A. E. S. and reported in the 36th Annual Proceedings (1949), page 163 *et seq.*—D. G. FOULKE.

Q. 147. For the past several months we have been brass plating a zinc die cast handle and obtaining very good results. However, due to the addition of another machining operation we must now replate these handles. Is it necessary to strip the brass from the handles in the replating process or can we replate without stripping?

A. The practical solution to this problem is to follow a finishing cycle similar to that required when the piece was originally finished. . . . A copper flash must be used in order to insure adhesion over the machined areas exposing the die cast metal.

A more concise answer cannot be given as the question is not detailed with such comments as to thickness of plated coatings, or whether the parts are polished, lacquered, or other condition.

Stripping of brass plate with a copper undercoat from zinc die castings can be done electrolytically with ortho-phosphate solutions that deplate the brass and copper, and passivate the zinc so no etching occurs or by oxidation processes such as the sulfide solutions, both of the above made and sold by various chemical houses under their own trade names.—GEORGE F. HERRMANN.

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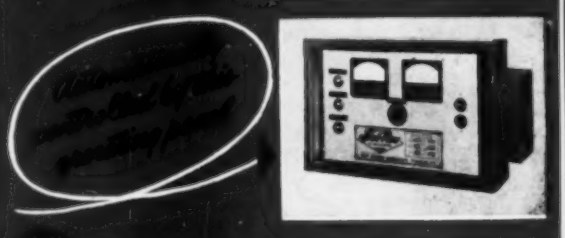

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Bright Tin-Nickel Plating. N. Parkinson. Metal Ind. **78**, 305–306 (April 20, 1951).

Presents results of experimental investigation of the above, showing that by appropriate choice of fluorides and their use in the correct proportions, solutions of mixed nickel and tin chlorides can be adjusted to deposit bright alloy plate within the desired *p*H range. Such solutions were stable and offered a wide metal-concentration range and a favorable metal-concentration ratio.

A Study of Acid Pickling Solutions. E. E. Halls. Electroplating **5**, 143–150 (1952).

The advantages of using inhibitors in pickling wrought iron and steel are discussed and data are presented giving weight losses obtained with hydrochloric and sulfuric acids on bright mild steel and cold rolled close annealed mild steel using quinoline, glue and an aromatic amino derivative (2) and an aromatic nitrogenous material.

Modified Bronze Plating. G. Schmerling. Metal Industry (Apr. 4, 1952).

A new cyanide type bronze plating solution, offered as a substitute for nickel, is described. According to the article, nickel plating equipment may be readily converted to the new process as rubber lined tanks are required. Maintenance is simple with but a daily check on free cyanide and caustic needed. The bath will deposit directly on steel, cast iron, copper and copper alloys, zinc base die-castings, and, with the zincate pretreatment method, on aluminum. The throwing power of the solution is described as superior

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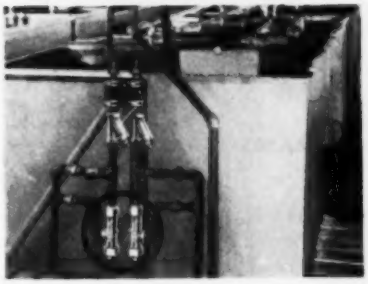

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Article Abstracts

to that of nickel. The rate of deposition, and the use of usual metal coloring methods of the bronze plate are reviewed. The various properties of the deposit hardness, corrosion resistance as compared with nickel, etc., are summarized to indicate its classification as a substitute for nickel.

The Storage and Handling of Acids and Cyanides. H. Saenger. J. Electrodepos. Tech. Soc., **27**, 23–33 (1951).

An elementary review covering the storage, safety measures in handling, and effects of burning and/or poisoning and first aid treatment for same, of the common mineral acids and cyanides.—*L. B. Sperry.*

Throwing Power and Covering Power in Electroplating Solutions. W. de Bruijn. J. Electrodepos. Tech. Soc. **27**, 1–11 (1951).

"Throwing power refers to the evenness of metal distribution over the cathode surface. Covering power refers to the extent to which the deposit covers the cathode surface". Factors affecting metal distribution are divided into three main stages, (1) Primary current distribution, (2) Secondary current distribution, and (3) Metal distribution. Theoretical aspects of each stage are discussed, and illustrated with graphs. Practical means of improving covering power are (1) applying strikes of metals which are subsequently easy to cover, (2) using initial strike currents, and (3) using special strike baths of high covering power (as silver). Micro throwing power is discussed, being distinguished from throwing power as ordinarily considered (ability to fill up scratches and other surface imperfections). Practical measures of obtaining the best possible throwing power by improving conditions in each of the three main stages before-mentioned are given. Emphasis is laid upon gaining practical benefit by a thorough understanding of the theoretical principles involved, and making corrections or improvements along fundamental lines. Discussion follows.—*L. B. Sperry.*

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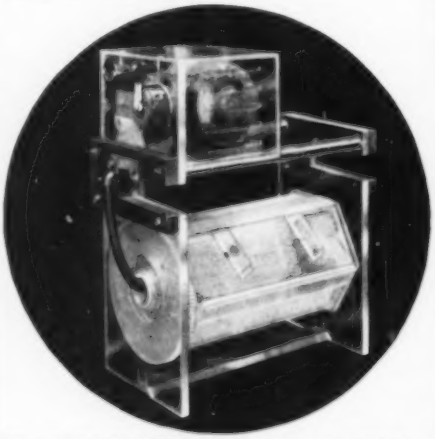

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Patent Abstracts

GEORGE B. HOGABOOM

Consultant, New Britain, Conn.

Copies of patents may be obtained by writing to Commissioner of Patents, Washington 25, D.C. Price 25 cents each.

No. 2,596,515, May 13, 1952—Coating Vitreous Substances—G. B. Watkins and R. A. Caiser, assignors to Libbey-Owens-Ford Glass Company, Toledo, Ohio.

CLAIM 1. A method of coating a surface of a glass article with metal, comprising treating said surface by exposing it while at a temperature in the neighborhood of the softening point to a chemical action of a tin halide in fluid form in contact therewith, placing the treated surface as a cathode in an electroplating bath opposite a stationary anode having a surface area coextensive with the entire area of said treated surface, and causing a metallic coating to be continuously formed on the treated surface at the line of juncture of said surface and the surface of the electroplating bath by lowering the surface of the electroplating bath while the metallic coating is forming on the surface of the glass article until said article is entirely out of said bath and a uniform coating has been deposited.

8 claims, 4 figures.

References cited: U. S. Patents 1,304,844; 1,335,174; 1,772,071; 2,103,538; 2,118,795; 2,290,911; 2,303,871; 2,304,182; 2,345,356; 2,391,930; 2,424,583; 2,429,402; 2,430,581; 2,482,054. Great Britain 275,223.

No. 2,600,343, June 10, 1952—Method of Making Conductive Patterns—Clifton M. Tuttle, assignor to Kenyon Instrument Company, Inc., Huntington, N. Y.

CLAIM 1. In the process of forming electrolytically conductive patterns by applying a conducting layer to an insulating base, the improvement which comprises printing a photographic latent image of the desired conductive pattern upon the gelatino-silver-halide side

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of a photographic film having a layer of base material supporting the gelatine, developing the image on the film, removing from the film the gelatine containing image, leaving the bare base material of the film over the area formerly occupied by the image and thus forming a stencil image defined by the originally unexposed gelatino-silver-halide, softening the bare base material while maintaining the remaining gelatino-silver-halide relatively hard, and covering the stencil side of the film with a conductive coating to cause the coating to adhere to the bare base material, thereby forming on the bare base material a conductive pattern corresponding to said image.

14 claims, 10 figures.

References cited: U. S. Patents 1,560,437; 1,614,263; 1,942,686; 2,058,396; 2,413,600; 2,441,960; 2,443,119; 2,447,541; 2,447,836; 2,506,604.

No. 2,602,774, July 8, 1952—Method of Plating Copper—John F. Beaver, Osborn, Ohio.

	Example 1	*Example 2*
$CuSO_4 5H_2O$	250 g/l	200 g/l
Sulfuric acid	60 g/l	50 g/l
Chloride anion	0.005 g/l	0.005 g/l
Dextrin	10 g/l	.....
Caramel or molasses	.....	0.10 g/l
Acetyl thiourea	0.015 g/l	0.03 g/l
Sodium octyl sulfate	0.02 g/l	.....
Sodium lauryl sulfate	.....	0.10 g/l
Temperature	95° F	95° F
Current density	100 amp/ft²	100 amp/ft²
Voltage	4.5	4.5
Agitation	Air	Moving cathode

CLAIM 1. In a method of electrolytically depositing copper from a sulfate-sulfuric acid bath containing acetyl thiourea in an amount from about 0.005 to 0.05 g/l and a chloride anion in an amount of from about 0.001 to 0.015 g/l the step of maintaining the chloride anion concentration at a constant value within the

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1— 600 A. Eager 6/12 V.
1— 500 A. Chandev. 12 V.
1— 300 A. Hobart 6 V.
1— 200 A. Boissier 6 V.
1— 200 A. U. S. 12 V.
1— 150 A. HVW 6 V.
3— 125 A. Hobart 6 V.
1— 120 A. Eager 7½ 15 V.
1— 100 A. HVW 6 V.

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4— 25 A. Diehl 25 V.
2— 100 A. G. E. 28 V.
1— 200 A. West. 28 V.
1— 500 A. G. E. 28 V.
1— 800 A. G. E. 28 V.
1—1500 A. Cont. 28 V.
1—2500 A. Cont. 28 V.

30 to 60 V.

1— 100 A. G. E. 32 V.
1— 200 A. West. 32 V.
1—1000 A. Cont. 32 V.
1—1000 A. Chandev. 40 V.
1—1250 A. Cont. 45 V.
1— 75 A. G. E. 50 V.
1— 325 A. West. 50 V.
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1—1000 A. G. E. 60 V.
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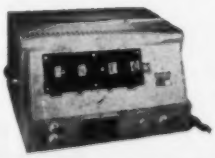

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range of about 0.001 to 0.015 g/l by addition of a chloride.

CLAIM 2. . . . containing a thiourea compound . . . maintaining the chloride anion . . . within the range of about 0.001 to 0.015 g/l. . . .

NOTE: The chloride anion is not named.

2 claims, 3 examples.

References cited: U. S. Patents 964,096; 2,355,070; 2,391,289; 2,462,670. British Patent 6,974. Clifton et al., Metal Finishing, pp. 457–458 (Sept., 1942). Buswell: Chemistry of Water and Sewage Treatment, pp. 74–76 (1928). Operating Manual, Daybrite Acid Copper Process, pp. 2–3.

No. 2,602,776, July 8, 1952—Electrolytic Method of Winning Zinc—G. J. J. Mould, assignor to Hudson Bay Mining and Smelting Company, Ltd., Winnipeg, Manitoba, Canada.

CLAIM 1. In a process of winning zinc which comprises electrodepositing zinc from a zinc sulfate electrolyte the improvement which consists in adding a sodium rosin soap to the zinc sulfate electrolyte in an amount effective to increase the current efficiency.

CLAIM 2. The improvement in a process of winning zinc as defined in claim 1 wherein the amount of sodium rosin soap added to said electrolyte varies between three-quarters of a pound and ten pounds per ton of cathode zinc to be deposited.

CLAIM 3. The improvement in a process of winning zinc as defined in claim 1 wherein the amount of sodium rosin soap added to said electrolyte is about one and one-half pounds per ton of cathode zinc to be deposited.

3 claims, 3 data charts.

References cited: U. S. Patents 1,876,156; 1,895,675; 2,113,517; 2,389,135; 2,389,179; 2,389,180. Transactions Electro Chemical Society, Vol. XLV (1924), pp. 414, 415, 420, 428. Silman: Journal of Electrodepositors Technical Society, Vol. 19 (1943–1944), pp. 131, 134, 141, 145.

No. 2,603,593, July 15, 1952—Electrodeposition of Metals—P. S. Blickensderfer, assignor to The Champion Paper and Fibre Company, Hamilton, Ohio.

This invention relates to the electrolytic deposition of metals and has particular value in local deposition of metals for filling of holes, pits, worn or peeled areas, cracks and scratches, the uniting of separate pieces, or for other purposes, and it has particular utility in securing and maintaining superior continuity and uniformity and a high degree of perfection in extensive smooth highly polished solid and plated metal surfaces.

CLAIM 1. Electrolytic method of closing openings in metallic surfaces, which comprises: mechanically imparting to an opening the form of a depression whose depth is slight relative to its least width; filling

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any part of the opening which is deeper than said depression, with electrically conducting material; providing said depression with a continuous uninterrupted electrically conducting surface throughout its entire area; enclosing the electrically conducting surface of said depression in an electrolytic cell; electrolytically preparing the surface of said depression for receiving an adherent electroplate; thereafter electrolytically depositing metal in said depression, and maintaining during said electrodeposition a substantially continuous flow of the electroplating solution through said cell, submerging and washing over the surface of said depression.

CLAIM 2. The method of claim 1 wherein the path of the electroplating current through the electroplating solution to its lowest part of the depression is maintained definitely shorter than the path to the edges of the depression.

21 claims, 25 figures, 8 examples.

References cited: U. S. Patents 1,090,456; 1,285,875; 1,645,927; 1,757,671; 1,809,872; 1,909,716; 1,918,605; 2,063,760; 2,293,810. British Patents 154,282; 156,999.

No. 2,607,724, August 19, 1952—Apparatus for the Manufacture of Tapered Conductors—Gordon F. Laing, assignor to George W. Borg Corporation, Chicago, Ill.

The present invention relates in general to methods and apparatus for the manufacture of tapered conductors, such as are suitable for use in manufacture of non-linear rheostats and potentiometers and the object of the invention is to provide new and improved methods of this character.

A feature of the present invention is the use of alternating current in the electrolytic bath rather than direct current, which makes possible a more compact and efficient arrangement of the electrolytic cell system.

CLAIM 1. Apparatus for processing wire by anodic reduction comprising two groups of electrolytic cells, said cells being arranged in a row with the cells of one group alternating with the cells of the other group, means for drawing a wire through said cells, two independent circulating systems for circulating electrolyte through said two groups of cells, respectively, said systems including parts made of insulating material for insulating the electrolyte in one system from the electrolyte in the other system, an electrode in each cell, a source of alternating current, and conductors connecting one terminal of said source to the electrodes in one group of cells and the other terminal of said source to the electrodes in the other group of cells.

3 claims, 4 figures.

References cited: U. S. Patents 1,066,412; 1,607,582; 1,614,562; 1,721,414; 1,959,531; 2,093,238; 2,374,449. British patents 4,120; 428,488; 467,024; 683,169. Journal-Electrodepositors Technical Society—Vol. 4 (1928–1929), pp. 137 through 139.

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A.E.S News

Interim Meeting in Columbus

The 1952-1953 Interim Meeting of the Supreme Society has been scheduled for January 10, 1953 in Columbus. The first Interim Meeting was held last year in Philadelphia and the meeting this year is expected to be even more successful because of the more central location of Columbus. Complete details, including the agenda will be supplied the delegates at a later date.

Technic Award

An agreement has been reached between the Executive Board and Technic, Inc., to change the title of the Technic Gold and Gold Plating Award to the Technic Precious Metals Award. Papers having to do with the plating of gold, platinum, rhodium, palladium and silver will be eligible for this award.

Dr. Blum to Represent A. E. S. in Australia

The Australian Branches of the A. E. S. plan to hold a Federal Convention in Melbourne in May, 1953. Plans are going ahead to provide an interesting program of papers, including one by Dr. William Blum.

The Executive Board of the A. E. S. has agreed to pay a portion of Dr. Blum's expenses as a part of the A. E. S. Internal Public Relations Program. The membership will look forward to Dr. Blum's report at the 1953 Convention as well as such reports as he may submit to PLATING in the capacity of Contributing Editor.

1952-1953 Branch Speakers List

ADDITIONS

BERKELEY INDUSTRIES (b)
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MILTON NADEL, Supervisor, Metal Finishing
Subjects:
1. *Defects in Plating Solutions and Their Remedies*
2. *Finishing on Aluminum*
3. *Practical Aspects of Plating on Zinc Base Die Castings*

THE CLEVELAND GRAPHITE BRONZE CO. (c)
17000 St. Clair Ave., Cleveland, Ohio—East and Midwest

R. A. SCHAEFER, Director of Research
Subject:
Selected Cathode Shapes and Their Effect on Metal Distribution

(Continued on page 1161)

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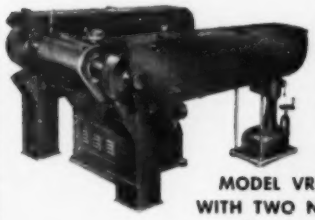

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Branch News

BRIDGEPORT BRANCH

The following officers have been elected by the Bridgeport Branch for the 1952–1953 term:

President—Raymond W. Gorak
First Vice-President—Virgil S. Consalvo
Second Vice-President—Philo Bailin
Librarian—Floyd Erlenmeyer
Secretary-Treasurer—Robert G. Parker
Sergeant-at-Arms—John Mallick
Board of Managers—M. J. Brassard, William Ehrenchona, Herman C. Braun, George C. Wagstaff

Robert G. Parker, *Secretary-Treasurer*

BRIDGEPORT BRANCH

Under a sunny and cloudless sky on August 9, 1952, the Bridgeport Branch of the A. E. S. held their annual outing and picnic at Eichner's Grove in Trumbull, Conn. More than 110 members and guests enjoyed themselves immensely from 11 A. M. until ??

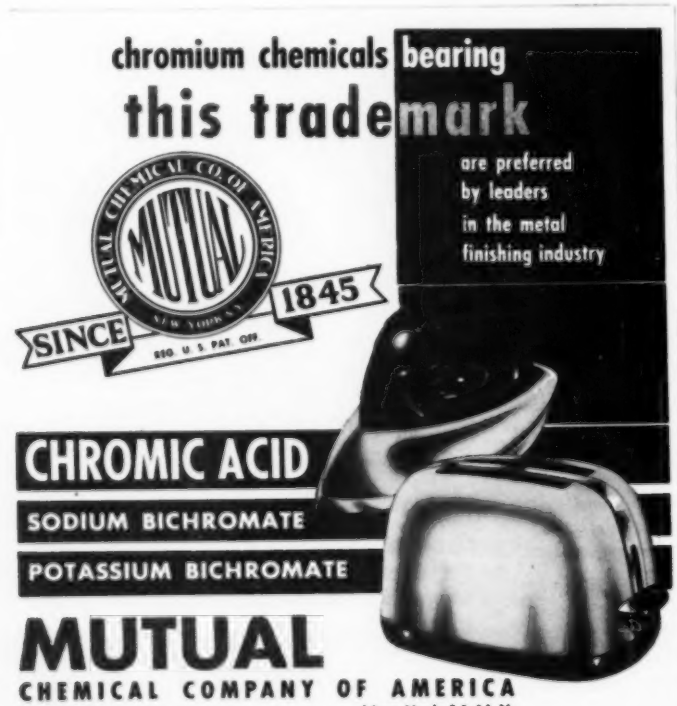
One of the features of the day was a softball game between the pushers and the platers; word was circulated that the pushers administered an ignominious trouncing to their opponents; however, no formal announcement to that effect was made. In addition, games of skill and luck in progress all day long attracted the interest of young and old in both sexes.

The prevailing spirit of good fellowship was whetted by the appetizing food, savory barbecued chicken, buttery corn on the cob and luscious watermelon served by the caterer.

Joe Bonazzo, Chairman of the Outing Committee, is to be congratulated on an excellent job.

Robert G. Parker, *Secretary-Treasurer*

Special afternoon and evening conference at the Federal Hotel, Melbourne, Australia. (1) President Harold Merton addressing members at the conference. Mr. Glen Walker seated. (2) Mr. J. J. Dale—introduction to lectures on "Chromium Plating With or Without Undercoats". (3) Group of interstate visitors discussing "shop" during supper breakoff



GRAND RAPIDS BRANCH

The meeting of November 7 to be held by the Grand Rapids Branch will feature a talk by Mr. Gerald Lewis, Keeler Brass Company, on the subject, "Metallizing in High Vacuum".

A color sound motion picture film on "Corrosion in Action" will be shown through the courtesy of the International Nickel Company.

Carl Green, *Publicity Chairman*

MELBOURNE BRANCH

The 72nd regular meeting of the Branch held on 21st August, 1952 was attended by 50 members and visitors at the Melbourne Technical College.

Prior to the opening of the meeting, half an hour of interesting films were screened.

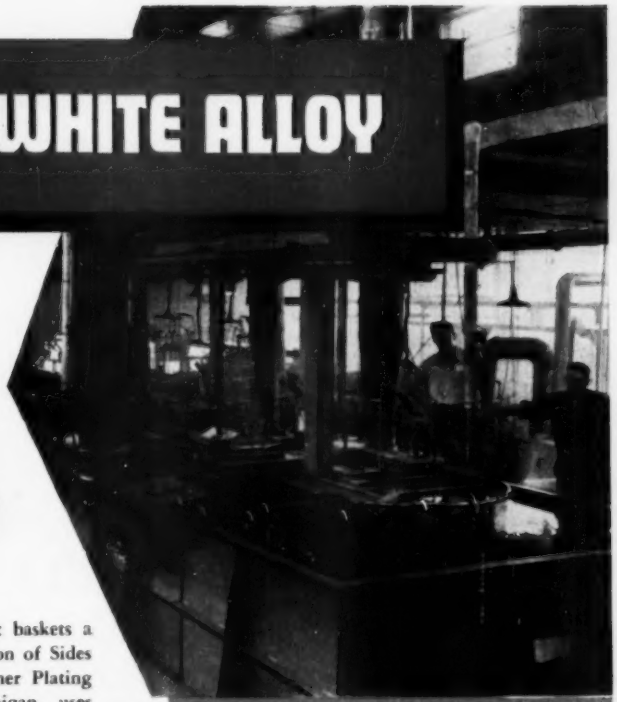
Our Librarian, Mr. Teague, introduced the speaker for the night, Mr. Glen Walker, whose subject was "Design and Manufacture of Plating Racks". Mr. Walker opened his address tracing the history of design in racks.

Costs of rack manufacture were stressed, bearing in mind plant required in manufacture, plus heavy cost of coating and coating materials. Interesting points were made comparing tape to plastic coating.

Comparison was made to cost of wiring articles as to racking, figures being taken

PROBRITE WHITE ALLOY

. . . answer to a tough job at Michner Plating Company



Joseph and Walter Michner, Michner Plating Company, Jackson, Michigan, looking over their fully automatic Probrite White Alloy line.

To plate 600 supermarket baskets a day for the Tote-Cart Division of Sides Manufacturing Co., Michner Plating Company, Jackson, Michigan, uses the Probrite White Alloy Process — production-proven alternate for copper-nickel-chrome.

Michner, a progressive firm that started 15 years ago as a small shop, has grown to be the largest independently owned plating concern in the Midwest. Their application of the Probrite White Alloy Process is added evidence that here, indeed, is an outstanding new finish for wire goods, hardware, tubular furniture, appliances, automotive accessories, tools and other products.

For complete information and technical data, write to Promat.

Brief Data on PROBRITE WHITE ALLOY

- For use directly over copper or steel.
- A bright-out-of-bath deposit.
- Over 200 hours resistance to red rust in salt spray.
- Plates easily at high current densities.
- Excellent covering power.
- Comparable in nearly every way to copper-nickel-chrome and greatly superior to copper-thin nickel-chrome or copper-chrome.

NEW **Probrite CR-723 Coloring Grade White Alloy . . . for use on parts that can be color-buffed. Very economical. Extremely easy to use . . . any shop can handle it. Write for data.**

PROMAT *Division*

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Branch News

from a leading manufacturer, giving overwhelming favour to racking. Authentic figures were quoted on an article which showed a saving of £1000 per annum.

Suitable slides and films taken from plating shops were shown and Mr. Walker answered questions put by members.

The meeting was brought to a close at 10:00 P. M. following a vote of thanks to the speaker by Mr. George Gatens.

S. B. Pearce, *Secretary-Treasurer*

MONTREAL BRANCH

The regular monthly meeting of the Montreal Branch of the American Electroplaters' Society for June was held in the Mount Royal Hotel at the usual hour.

Through the courtesy of Imperial Oil Company of Canada, 23 members and guests were shown two films on oil development in Canada. The titles of the films shown were "Oil for Canada" and "Search Unending". The first of the above-mentioned films described how oil is brought to Canada. The second film dealt with oil development in our country, along with the various types of equipment at present in use in the search for oil.

The films shown were very interesting and educational. The attitude shown by the audience was one of attentiveness and appreciation. Members of Imperial Oil Company present were thanked by J. T. Reisenburg.

Clifford Skelding, Metal Industries, Ltd., was elected to membership. Meeting was adjourned until September 9.

J. T. Reisenburg, Jr., *Secretary*

NEWARK BRANCH

The regular meeting of the Newark Branch A. E. S. was held on June 20, 1952 at the Hotel Robert Treat, Newark, N. J.

In the absence of President Robert Eibhardt who was attending the Chicago convention, First Vice-President Robert Horrocks conducted the meeting.

The application of Martin Kaplan of Airtron, Inc., Linden, N. J., was received and ordered to take regular course. The following were elected to membership in Newark Branch: Arthur Avila, Guarino Lupinette and Alexander Korbelak. The resignations of Alfred Althouse and Harold Blanchard were received and accepted.

Librarian Thomas Austin introduced the speaker of the evening, A. Korbelak, who spoke about the highlights of the convention.

Meeting adjourned at 9:45 P. M.

George Reuter,
Recording Secretary

PROVIDENCE-ATTLEBORO

A regular monthly meeting of the Branch was held at the Providence Engineering Society Hall on Monday, April 21, 1952.

The speaker, Myron B. Diggin, Technical Director of Hanson-Van Winkle-Munning Company, was introduced by Dr. E. Parker. The talk on the subject of modern Bright Silver plating was followed by a lengthy discussion period.

The annual reports of the officers were read and approved.

The meeting was adjourned at 10:30 P. M.

George A. Gibbs,
Secretary

ROCKFORD BRANCH

The Rockford Branch held its annual picnic June 9 at S. M. and S. F. Park.

The picnic started at 4:00 P. M. and dinner was served promptly at 6:00 P. M. The menu consisted of baked ham, baked beans, potato salad, cheese, salad, relishes and coffee.

Bill Geissman, Herman Rewerts and Vern Wissen served on the committee.

Stuart Golding was responsible for the excellent movies which were shortsen Foreign countries all over the world.

A good time was had by all with an attendance of 39 persons.

Kenneth A. Kieselburg,
Secretary-Treasurer

SYDNEY BRANCH

The 84th meeting of this Branch was held at the Trust Building, King and Castlereagh Streets, Sydney, on Thursday 10 July with an attendance of 30 members and 7 visitors.

Our guest speaker was Dr. Wagner, a German expert on electroplating and other methods of surface treatment, who had been brought to Australia to serve as

RICHARDSON ALLEN RECTIFIERS

an unfailing
D-C SUPPLY
for quality plating

ANNOUNCING
PERIODIC REVERSE
You may now obtain a R-A Periodic Reverse Unit for electroplating generators, and one for electroplating rectifiers up to 2,000 amperes.

For increased production, improved quality, fewer rejects, lower labor costs—which translates into higher profits—use Richardson-Allen dependable rectifiers.

The basic R-A Rectifier is widely used where a single voltage or current is needed or where several rectifiers are to be paralleled.

For electroplating chrome or bright nickel a 22-position tap switch is supplied. For electroplating gold or silver, and for anodizing a 36-position tap switch is used.

A special Heat Exchanger unit is available for use in corrosive atmospheres. This R-A development permits operation at elevated ambient temperatures with a minimum temperature rise. Long, uninterrupted, dependable service is assured.

write for descriptive literature

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LEADING POWER CONVERSION SPECIALISTS

Schorithene

FLAME-SPRAYED CORROSION-RESISTANT POLYETHYLENE-LINED DRUMS

Better - Yet Costs Less!

Seamless *Standard*

Platers are enthusiastic about these new corrosion-resistant drums for operations where they formerly used breakable glassware and crocks . . . dipping, storing, plating, filtering, etc. . . . for practically any chemical used in the plant!

Schorithene is a seamless plastic lining made of polyethylene powder with the patented Schori Flame-Spray Pistol . . . the most corrosion-resistant material available today. Bonds firmly to metals, assuring long life; easy to clean. Drums coated on outside with plastic paint as protection against splash and drip.

Order Schorithene-lined drums directly from us or your distributor. See price list. Prices F.O.B. Long Island City; orders accepted from rated companies, otherwise payment with order. No COD's.

PRICE LIST

Gallon Cap.	Inside Diam.	Inside Height	List Cost
	STANDARD		
3½	11"	9"	$7.50
5	11"	12"	9.50
15	15"	20"	17.50
20	18"	20"	24.50
30	18"	27"	29.50
55	22"	34"	36.50
	SEAMLESS		
30	18"	27"	40.00
50	22"	34"	52.00

Covers $4.00 extra

Custom Spraying of Tanks, Pumps, Agitators, etc.
Distributor Territories Open

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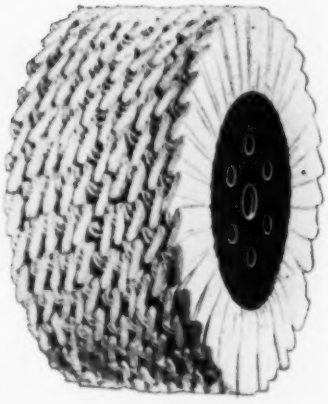
FERRO-CO CORPORATION

VERNON BLVD. AND 43rd ROAD
LONG ISLAND CITY 1, N. Y.



For de-burring and fast cutting on all metals. Exceptionally good on sharp corners and deep spots. Type 302, all dia., 6"—18"

Use Type 302

CHURCHILL FINGER-BUFFS* for Cutting-down Stainless Steel faster . . .

FINGER-BUFFS* Reduce Production Costs

Churchill Finger-Buffs* with high-count, bias-cut cotton cloth and "self-air-cooled" buff fingers, provide longer buff life and greater production capacity.

You will make new savings with Churchill Finger-Buffs* because of their extra-fast cutting-down action. And a real economy when used to remove burrs and rough spots! The tougher your job, the better you'll like your Churchill Finger-Buffs*.

FINGER-BUFFS* for every Surface Finish

Construction of the Churchill Finger-Buff* can be regulated to produce the type of finish required on any metal surface. Write us your finish problem.

FINGER-BUFFS* for every Buffing Need

There is a Churchill Finger-Buff* for every buffing, polishing and de-burring need. Churchill Finger-Buffs* give you superior performance at lower cost.

Now is the time to make new savings, many ways, with Churchill Finger-Buffs*.

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Please send me FREE catalog and complete information.

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If your production involves finishing zinc, cadmium, aluminum or cuprous metals, you owe it to yourself... and your customers... to investigate
IRIDITE
for on any of these metals Iridite gives you a high performance finish at a low cost from a simple chemical dip:
IF YOU WANT HIGH CORROSION RESISTANCE,
you'll find an Iridite that will meet any military or civilian specifications for chromate finishing.
IF PAINT ADHERENCE IS IMPORTANT,
you'll find Iridite prevents underfilm corrosion and soap formation.
OR, FOR BRIGHT, DECORATIVE FINISHES–
investigate zinc plate and Iridite (Bright) for a chrome-like decorative finish with more corrosion protection than conventional chrome plating . . . or Iridite (Metcote) as a treatment for copper that eliminates the need for buffing in the copper-chrome system; produces a sparkling bright finish!
Write for literature and send us samples for test/processing. See "Plating Supplies" in your classified telephone directory or write direct.
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Branch News

a Technical Consultant on the staff of the Ministry of National Development.

His talk dealt with many problems that he had seen in the plating trade in Australia, which he said could be rectified to save money and costly labor. Drag out and racking were two good examples of this in which scarce materials in the former and costly labor in the latter could be saved.

In finalizing his talk Dr. Wagner spoke about automatic plating shops, and tanks, and the different types of plating barrels that are used today. During his talk a number of slides were shown which emphasized fully many of the points which Dr. Wagner spoke about. On completion of the talk many questions were asked, and then Mr. E. WRIGHT and Mr. B. ARMSTRONG moved a vote of thanks to Dr. Wagner.

The 85th meeting of this Branch was held at the Trust Building, King and Castlereagh Streets, Sydney, on Thursday 14th of August, with an attendance of 11 members and 1 visitor.

A period of silence was observed to express our sympathy at the passing of W. PATERSON, who from the time he joined the Society in 1944 had held the office of President; First and Second Vice-Presidents; Secretary-Treasurer; and had been on many Committees in which he did a very fine job for the Society. His loss will be felt by this Branch.

One of our interstate members from Queensland was MR. GOUBAREFF and his presence was felt when he asked the following questions:

1. Has P.R. Plating any advantage over Rochelle Cyanide Copper for plating copper coatings of approx. .001 inch on general steel work?

2. Is it possible to operate copper anodes with anode bags (not diaphragms) successfully over day long periods in the Rochelle cyanide copper bath?

3. What is the best practical formula for this process?

After a lengthy discussion in which the value of copper undercoats was mentioned, it was decided that Mr. Goubareff would be taken around to a few plating shops before going back to Queensland.

As MR. VENN from Ducon Condensors was unable to lecture us, a picture night was hurriedly arranged and the films, "Heat Treatment of Steel", Parts 1 and 2, were shown. These films depicted various methods of hardening of steels; making of a bumper bar from a flat steel strip being pressed into shape and trimmed, polished mechanically and by hand; the different plating operations and the final product assembled on the car. Two other lighter films were shown to round off the evening.

B. BRIDGEMENT,
Secretary-Treasurer

There's plenty of reserve capacity, more than enough for all your needs. And take a look at the acid and alkali resistant coating on these oversize transformers and selenium stacks—that's real assurance of dependable long life. But that isn't all. Those connections from the transformers to the selenium rectifiers are so flexible that floor vibrations can't possibly loosen the cell connectors. And for ventilating, the chimney effect produced by drawing clean cool air through the cabinet cuts the danger of overheating. These advantages are built into every H-VW-M rectifier—the ones you see in these crates ready to be shipped—and those in service all over the country. They're built to last for *years*.

Durable, dependable rectifiers are only one of the many results of H-VW-M's constant progress in electroplating development for more than eighty years. It's a continuous policy, best summed up in H-VW-M Platemanship . . . your working guarantee of the best that industry has to offer—not only in rectifiers—but in every phase of plating and polishing.

8529

PLATEMANSHIP

PLATEMANSHIP
Plating & Polishing Equipment Supplies

this oversize rectifier transformer is typical of H-VW-M "extras"

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

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H·VW·M

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

Membership Report of the A. E. S.

Elections

ADELAIDE: Ronald G. Banks, Robert E. Machin, F. McIntyre, S. B. Mitchell

DALLAS-FORT WORTH: Pete J. Donohue, Frank B. Swift

MELBOURNE: T. J. Bitmead, F. H. Chapman, A. P. Howell, R. S. James, R. F. Kemp, J. McHardy, R. B. Read

MONTREAL: Clifford Skelding

NEWARK: Arthur J. Avila, A. Kocbelak, Guarino C. Lupinetti

ROCHESTER: Llewellyn J. Hutchings, John J. Pullano, Stanley W. Rosowski, Robert C. Steveling, Leonard Treman

SYRACUSE: Michael Guarneri

MEMBERSHIP-AT-LARGE: J. C. Nuffel, Antwerp, Belgium; N. Thon, Princeton, N. J.

Reinstatements

DETROIT: W. N. Dunlap (Armed Services)

Transfers

Clinton Murray from Dallas-Fort Worth; Fred G. Brune to Detroit; John H. Leever to Detroit; Arthur M. Linn from Detroit; William C. Pollard to Los Angeles; Sam Rosenblatt from New York; Harley E. Balet from Rockford

Resignations

CINCINNATI: George F. Willett, Jr.

CLEVELAND: Ivan C. Mansteller, Frank M. McDonald, Vasil P. Nasteff

DALLAS-FORT WORTH: C. Kirkpatrick, G. Mellina, J. Shaw, L. Stewart, E. Teer, W. Vaughan, E. Weiss

LOS ANGELES: John Buchanan, Joseph Bylinowski, James Carter, Ernest Francis, Phil Greathead, Theo. Kertu, Harry Lieb, Dennis McDermott, Myron Miller, Walt Plummer, Mitchell Raskin, Ray Steele, Jack Warren

MONTREAL: Walter Ramsbottom

NEWARK: Alfred K. Althouse, Harold Blanchard, Nathaniel Winslow

Suspensions

DAYTON: Walter E. Carlson, Kermit E. Froebe, William Hohman, Alden McGowan, W. H. Mohr, G. L. Speakman, F. H. Thompson, Forrest L. Valentine

MELBOURNE: R. M. Bailey, J. Blake, W. H. Bristowe, O. Broughton, W. C. Dart, A. R. Durnford, F. D. Elliott, R. Fennessy, A. E. Fergie, E. N. Glass, A. L. Glover, R. Graham, M. W. Hall, J. H. Hunt, I. J. Johnstone, C. McCarthy, C. S. Meaker, L. P. Nation, N. Perkins, W. T. Perkins, K. W. Russell, G. A. Sauvola, B. Smith, A. Storey

PROVIDENCE-ATTLEBORO: Frank L. Downer, E. L. Hoar, R. V. Rioux

ST. JOSEPH VALLEY: J. P. Borden, Ron Fandt, Kenneth Harlan, George E. Nidy, C. Sigler, R. A. Simpson

SOUTHEASTERN: P. E. Pennington, Paul Stevens, J. A. Tony, J. A. Wilkosz

SYRACUSE: Gerald W. Backus

Deaths

HARTFORD: James J. O'Shea

ROCHESTER: Michael Andrews

Membership Competition

BRANCH	Membership Apr. 1, 1952*	New Members	Net Change in Membership	Per Cent Net Change
First Group				
Toronto	132	7	+ 7	+ 5.3
New York	305	17	+15½	+ 5.1
Milwaukee	145	8	+ 6½	+ 4.5
Cleveland	212	10	+ 4½	+ 2.1
Philadelphia	203	4	+ 3	+ 1.5
Newark	240	6	+ 3½	+ 1.5
Grand Rapids	155	3	+ 2	+ 1.3
Bridgeport	154		+ ½	+ 0.3
Pittsburgh	132	5		
Boston	140			
Detroit	500	1	− 6½	− 1.3
Hartford	148	2	− 3½	− 2.4
Chicago	469	28	−19	− 4.1
Melbourne†	168	15	−10	− 6.0
Los Angeles	218	1	−15½	− 7.1
Second Group				
New Haven	88	6	+ 7	+ 8.0
Cincinnati	80	4	+ 4	+ 5.0
Montreal	72	4	+ 3	+ 4.2
Baltimore-Washington	96	3	+ 2½	+ 2.6
Rochester	88	9	+ 2	+ 2.3
Indianapolis	114	3	+ 2	+ 1.7
Buffalo‡	167	1	+ 1	+ 0.9
Waterbury	115		+ ½	+ 0.4
St. Louis	102			
Saginaw Valley	71			
Syracuse	104	6	− 2	− 1.9
Providence-Attleboro	92	2	− 4	− 4.3
St. Joseph Valley	74	2	− 4	− 5.4
Sydney	86	2	− 7	− 8.4
Dayton	81	3	− 7½	− 9.3
Rockford	79	3	−15	−18.9
Third Group				
Louisville	24	9	+ 9	+37.1
Toledo	39	4	+ 6	+15.4
Kansas City		3 (34)	+ 3	+ 8.8
Dallas-Fort Worth§	69	13	+ 5½	+ 8.0
Adelaide	58	4	+ 4	+ 6.9
Springfield	55	3	+ 3	+ 5.5
Twin City	66	5	+ 3	+ 4.5
San Francisco	67	3	+ 3	+ 4.5
Lancaster	67	4	+ 2	+ 3.0
Jackson-Lansing	59	1	+ 1	+ 1.7
Columbus	54			
Allentown-Reading	44			
Houston	40			
Hamilton	22			
Wichita		(19)		
Southeastern	47	7	− ½	− 1.1
Western Ontario	19	2	− 1	− 5.3
Outside Competition				
At Large	125	7	+ 7	
In Transfer	23			
Total A. E. S.	5,748	276	+68½	+ 1.2
Active Membership, July 31, 1952			5,816	

*Subject to correction. †, ‡, §Winners in first, second and third group, respectively, of 1951–1952 membership competition.

How to make aluminum look like satin

Pennsalt AE-18 gives beautiful etch with fewer maintenance man-hours

When the makers of a well known line of refrigerators switched from stainless to aluminum refrigerator evaporators, they installed a brand new layout in the finishing department. The evaporators came down a continuous line to be cleaned of stamping oil and brazing flux, then etched, followed by anodizing. The etch, of course, was the critical step.

The representative from Pennsalt's Metal Processing Service recommended a five-step cycle, as follows:

1. Clean with Pennsalt Cleaner MC-1
2. Hot rinse
3. Etch with Pennsalt AE-18
4. Rinse
5. Anodize

Result: Pennsalt AE-18 produced that rich satin finish so necessary in the refrigerator industry. In fact, the finish is so uniformly good that the superintendent, the process engineer and the development engineer are planning to discontinue painting with aluminum paint.

Cuts Tank Cleaning Time

Just as important to cost-conscious production men is AE-18's economy. The *original* non-scaling etchant, AE-18 doesn't form a rock-like deposit in the etch tank—can be flushed out with a hose in minutes. Compare this with the former method of laborious hand-chipping of granite-like scale, and you have savings of up to 36 man-hours *every week* on tank cleaning! The men on the tank, too, like Pennsalt AE-18 because of the reduced fuming and easier solution control.

Your Pennsalt Metal Processing Service representative is thoroughly trained and experienced in the problems of aluminum etching, as well as other finishing problems. Discuss your needs with him, or write: Pennsalt Metal Processing Service, 1000C Widener Bldg., Philadelphia 7, Pa.

Cold-working Steel?

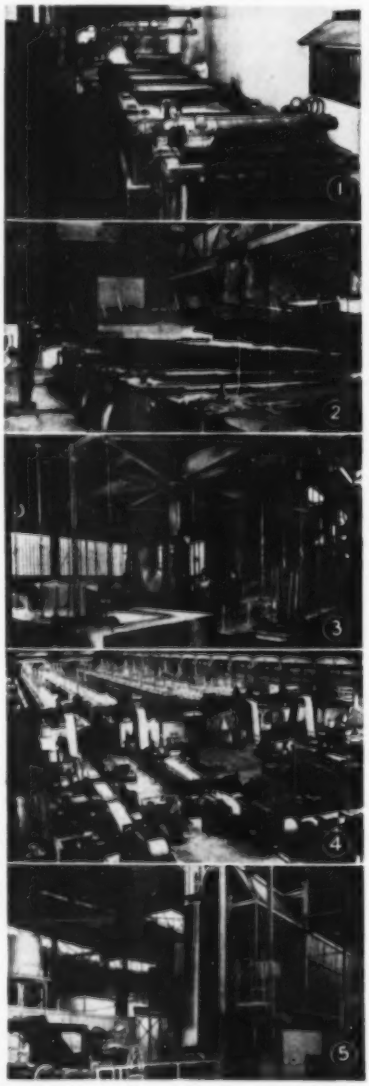
Investigate Pennsalt's new Fos Process, an integrated method for protecting steel and dies during extreme cold working. Ask your Pennsalt man, or outline your problem in a letter.

Pennsalt Chemicals

A BETTER START FOR YOUR FINISH

AMERICAN CHEMICAL PAINT COMPANY
AMBLER ACP PENNA.

Technical Service Data Sheet
Subject: EFFICIENT PICKLING WITH RODINE®



1. Rod and wire are pickled clean with "Rodine" without wasting either acid or metal. Breakage in drawing due to acid brittleness is minimized.

2. "Rodine" protects the exterior of tubes while completely descaling the interior and minimizes breakage in drawing due to acid brittleness.

3. "Rodine" makes possible the batch pickling of sheets over a wide range of acid concentration and temperature.

4. Whether sheet steel is pickled continuously or in batches, "Rodine" improves the surface and prevents "pickle burning" in prolonged pickling.

5. The absence of pitting and the smoother surface obtained with "Rodine" saves expensive coating metal in electrolytic tinning and galvanizing.

CHEMICALS ACP PROCESSES

WRITE FOR DESCRIPTIVE FOLDER ON "RODINE" AND INFORMATION ON YOUR OWN PICKLING PROBLEM.

CHEMICALS ACP PROCESSES

Branch Speakers List

(Continued from page 1152)

DIAMOND ALKALI COMPANY (c)
Cleveland 14, Ohio—Any Branch
E. L. Combs, Technical Service Division
Subject:
Chromic Acid—Manufacture, Distribution and Service to Industry

GENERAL MOTORS CORP. (c)*
Research Laboratories Division, P. O. Box 188, North End Station, Detroit 2, Mich.—No arbitrary geographical limit.
C. F. Nixon, Head of Electrochemistry Department
Frank L. Clifton, Engineer-in-charge Electroplating Laboratory
Subject:
Topic to be selected

GOULD ELECTROPLATING CO. (c)
417 E. 76th St., New York 22, N. Y.—East only
George Schore
Subject:
Any practical subject desired, including barrel plating, etc.

FREDERICK GUMM CHEMICAL CO., INC. (c)
538 Forest St., Kearny, N. J.—East
A. S. Kohler, Assistant Technical Director
Subjects:
1. *Barrel Burnishing*
2. *Barrel Deburring*
3. *Aluminum Etching and Deoxidizing*

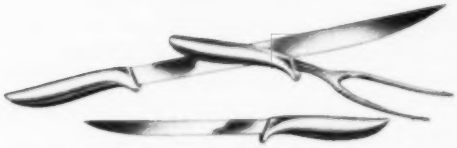
THE HARSHAW CHEMICAL CO. (c)*
1945 E. 97th St., Cleveland 6, Ohio—Any branch east of the Mississippi and north of the Ohio rivers.
H. E. Nice, Electroplating Division Manager
Subject:
Nickel—Supply and Demand

PHILADELPHIA RUST-PROOF CO.
3227 Frankford Ave., Philadelphia 34, Pa.—(c) nearby branches, (b) distant branches
Dr. Samuel Heiman, Chief Chemist
Subject:
Metal Coatings by Electroplating, Hotdipping, Spraying, Cladding and Cementation

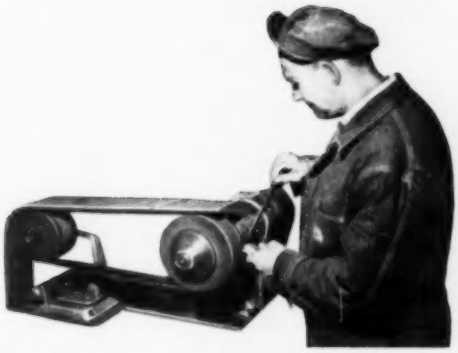
GEORGE P. SWIFT—Electrochemical and Spectrochemical Laboratories (c)
53 Galen St., Watertown 72, Mass.—Eastern U. S. and Canada
Dr. G. P. Swift
Subjects:
1. *Barrel Silver Plating of Small Parts*
2. *Barrel Gold Plating of Small Parts*
3. *The Other Fellows' Headaches*

*Note: See original list in the September issue for other speakers from these companies.

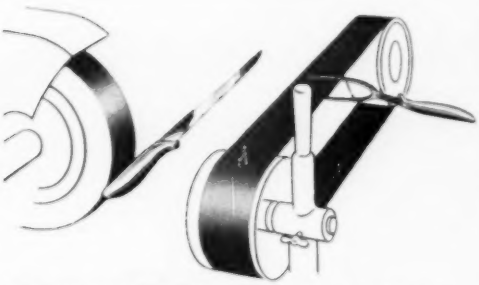
How would you SOLVE IT?



PRODUCTION PROBLEM: To cut unit costs of finishing cutlery sets and produce a more uniform finish. (Manufacturer was using set-up wheel method which finished only four blades an hour, left unsatisfactory finish.)



SOLUTION: 3M Engineering suggested that Gerber Legendary Blades of Portland, Oregon switch to the 3M Backstand Method, using Three-M-ite and Tri-M-ite Cloth Belts. This new method is currently *turning out 27 blades an hour*—six times the previous production!



KNIFE HANDLES' delicate lines and compound curves are brought out quickly, easily—**FORK TINES'** desired sharpness is easily produced. 3M Backstand Method gives the workman *complete control*. Lets him do better work in less time—every time.

RESULTS: Carving sets of matchless beauty finished at lower unit cost! 3M Sales Representatives can help *you* solve your grinding problems, too. Send coupon for facts.

Minnesota Mining & Mfg. Co.
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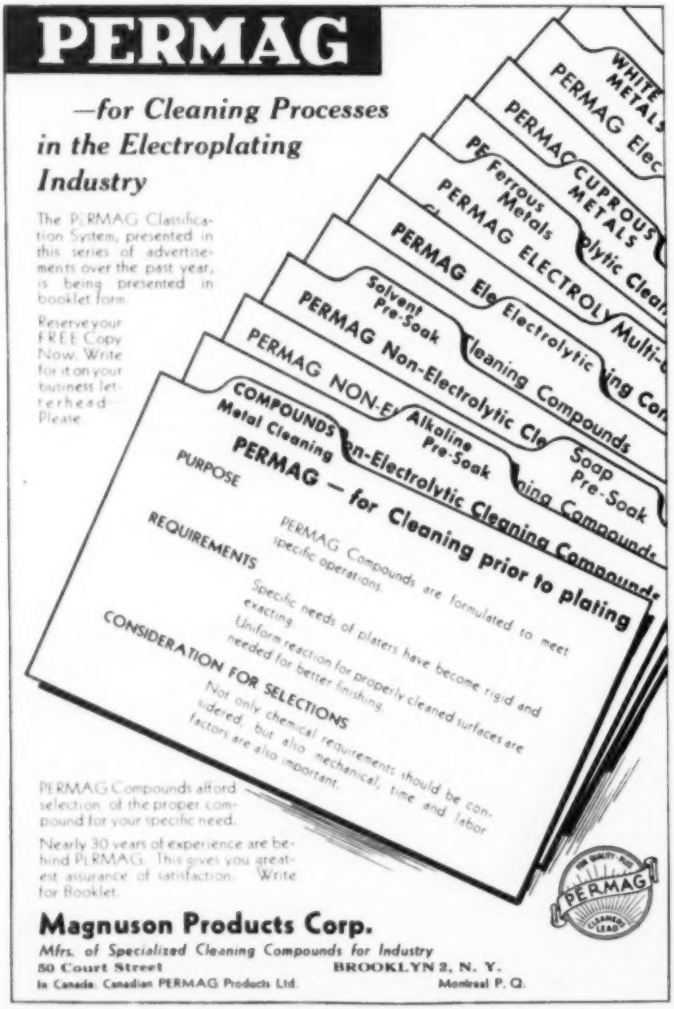
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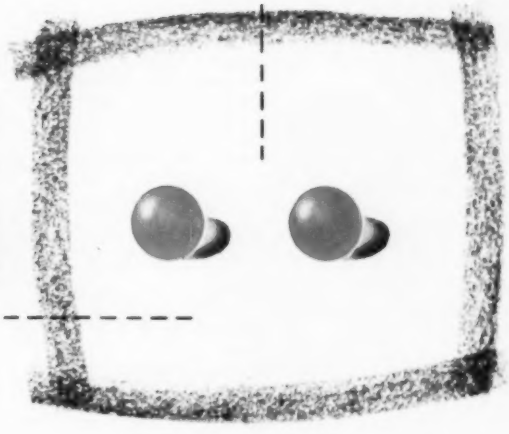

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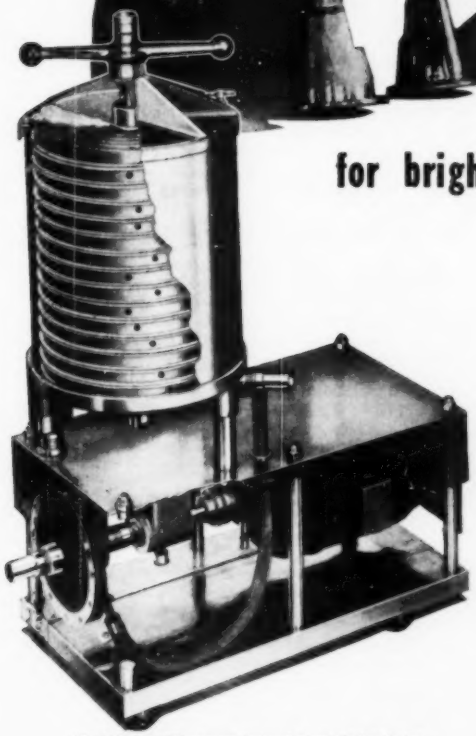

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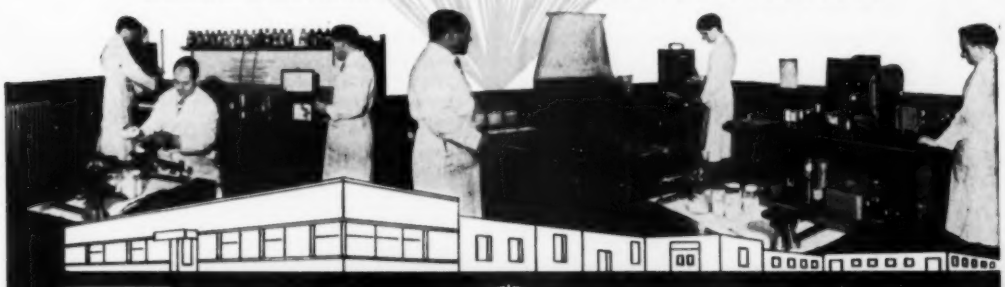

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SOUTHEASTERN meets second Friday of each month in the Georgia Hotel, Atlanta, Ga. Secretary-Treasurer, W. T. Weymouth, 173 Clay Street, S. E., Atlanta, Ga. Research Finance Committee Chairman, Dr. Fred Cox, Georgia School of Technology, Atlanta, Ga.

SPRINGFIELD meets fourth Monday of each month in Hotel Charles. Secretary, R. J. Girard, 145 Waite Avenue, Chicopee Falls, Mass. Research Finance Committee Chairman, James Laing, c/o Van Valkenburg Company, Montgomery Street, Willimansett, Mass.

SYDNEY, AUSTRALIA meets second Thursday of each month at 7:30 P. M. in the Trust Building, King and Castlereagh Streets. Secretary-Treasurer, B. Bridgement, 19 Adelaide Street, Belmore, Sydney, N. S. W., Australia.

SYRACUSE meets third Monday of each month in Loyal Order of Moose Hall, 643 W. Onondaga Street. Secretary, Lindley Wood, 1329 Bellevue Avenue, Syracuse 4, N. Y. Research Finance Committee Chairman, George W. Cavanaugh, 129 Kenwood Avenue, Syracuse, N. Y.

TOLEDO meets first Thursday of each month at Commodore Perry Hotel. Secretary, Gaston Bergeman, 703 Pine Street, Fremont, Ohio.

TORONTO meets second Friday of each month in Royal York Hotel. Secretary, Walter E. Mark, 761 O'Connor Drive, Toronto, Canada. Research Finance Committee Chairman, C. D. Short, 1281 Pape Avenue, Toronto, Canada.

TWIN CITY meets first Monday of each month, October through June, in the Covered Wagon (Lodge Room), 114 S. 4th Street, Minneapolis, Minn., with dinner at 7:00 P. M. and business and technical session at 8:00 P. M. Secretary-Treasurer, Robert L. Buckley, c/o Industrial Chemical & Equipment Co., 205 11th Avenue So., Minneapolis 15, Minn. Research Finance Committee Chairman, E. H. Lindemann, c/o Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

WATERBURY meets second Thursday of each month in Elton Hotel. Secretary-Treasurer, Spencer L. Henn, P. O. Box, Dr. B, Cheshire, Conn.

WESTERN ONTARIO meets third Friday of each month in William Pitt Hotel, Chatham, Ontario. Secretary-Treasurer, K. W. Farquhar, c/o Wallaceburg Brass, Ltd., Wallaceburg, Ontario, Canada.

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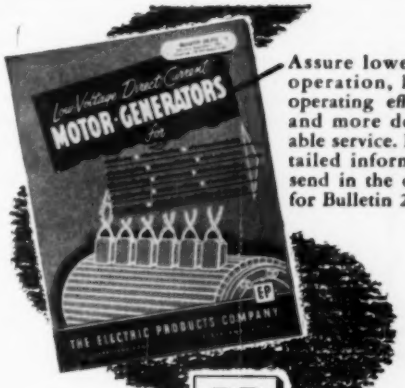

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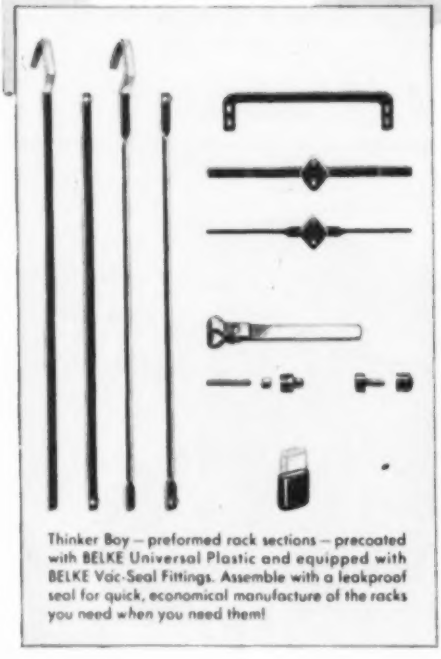

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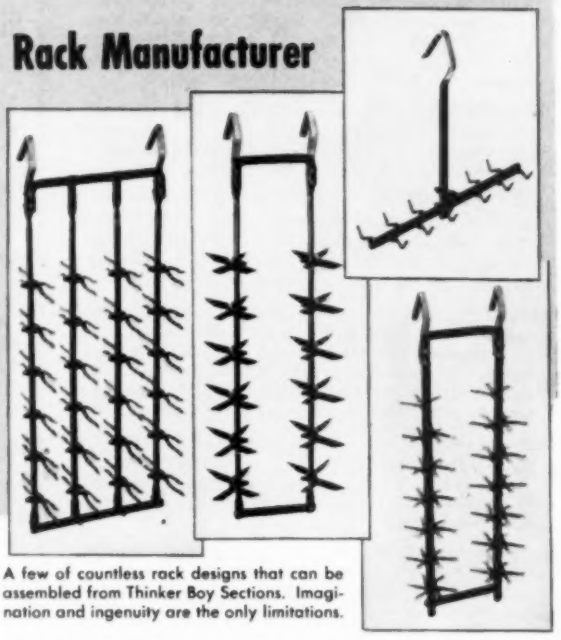

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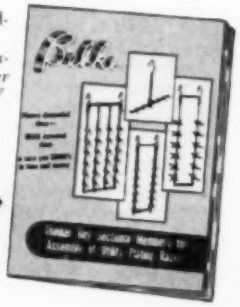

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40TH NATIONAL SAFETY CONGRESS AND EXPOSITION, sponsored by the National Safety Council, Chicago, Ill., October 20–24.

THE ELECTROCHEMICAL SOCIETY, Fall Meeting, Montreal, Canada, October 26–30.

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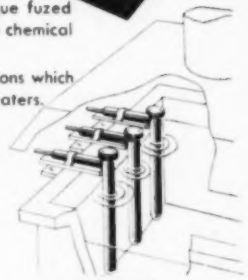

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